AVIATION WEEK

A McGRAW-HILL PUBLICATION

MAY 2, 1949

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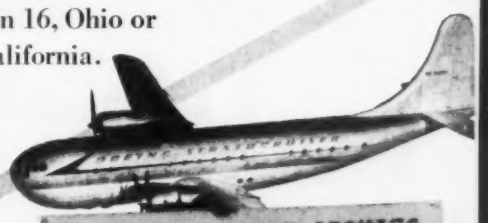

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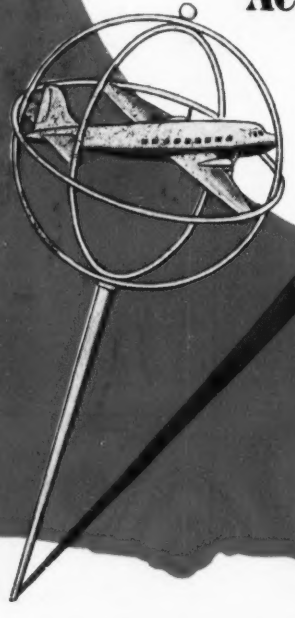

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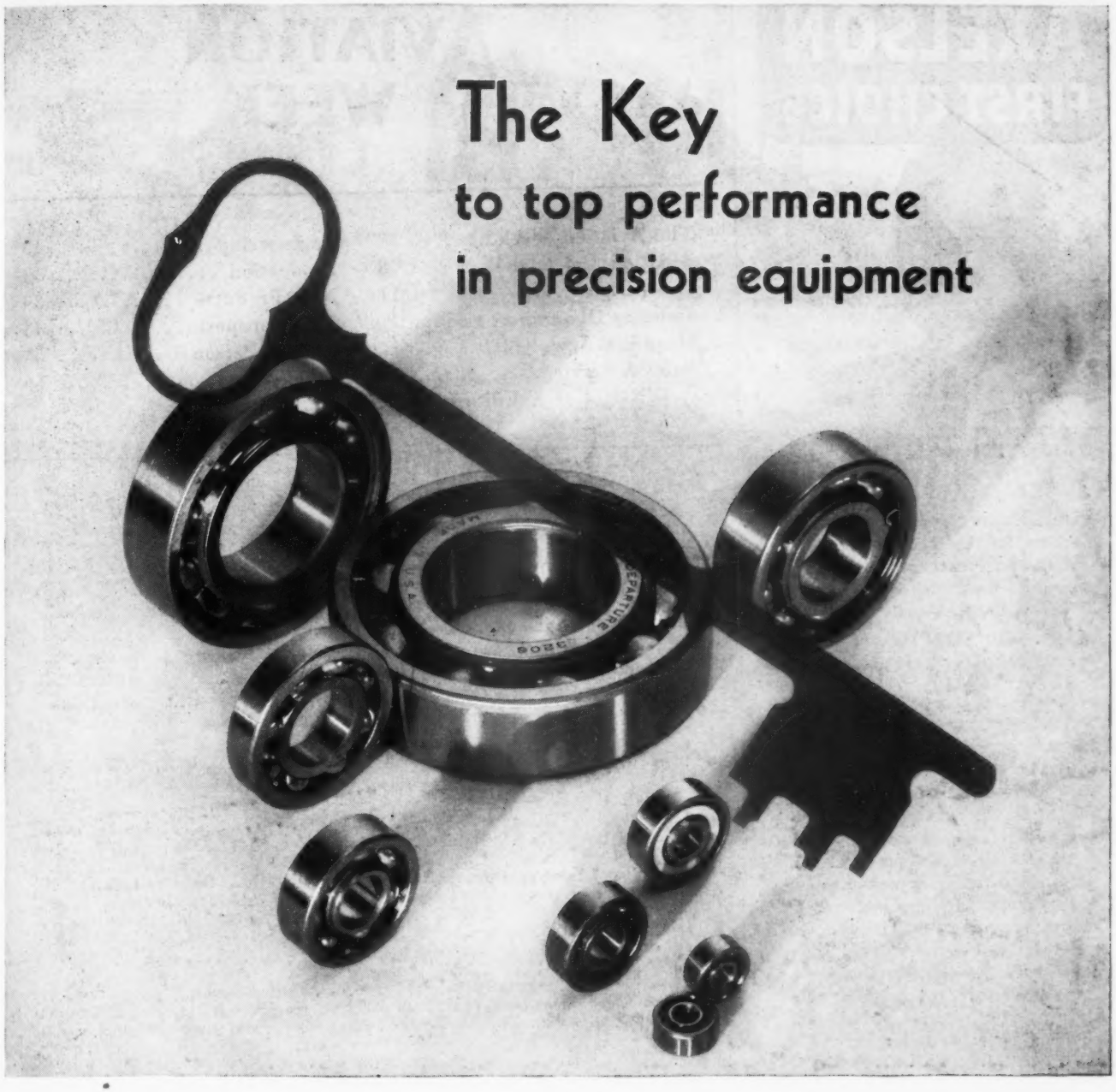

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Axelson is currently producing superchargers for cabin pressurization of the Douglas DC-6 airplane. Numerous Axelson experimental projects are under way, in design stage, production stage and on actual operating tests. Axelson engineering maintains constant research to provide more efficient equipment, combining economy with finest quality.

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MANUFACTURING COMPANY

AIRCRAFT DIVISION

6160 South Boyle Ave.
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Vol. 50, No. 18

AVIATION WEEK

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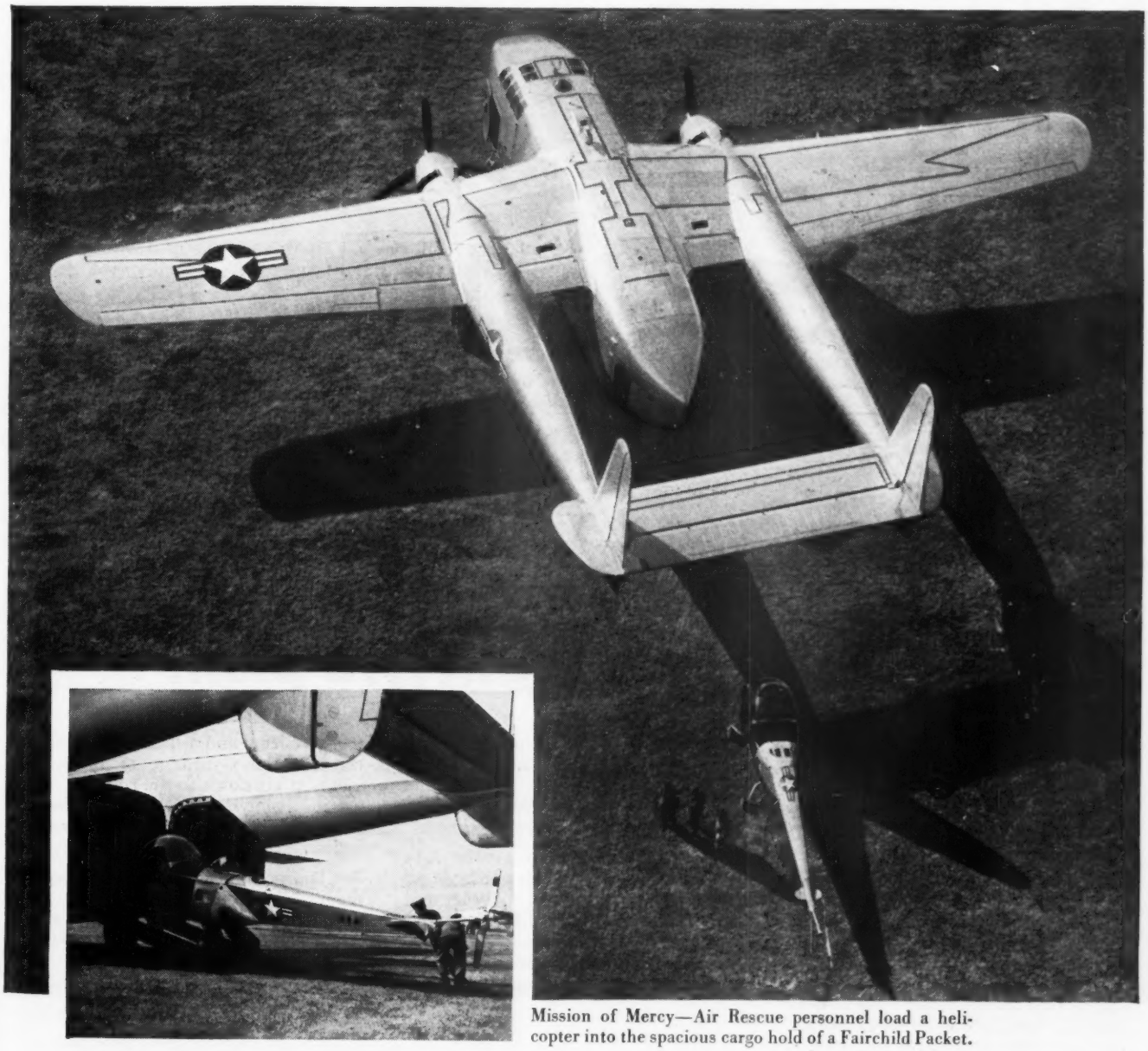

Mission of Mercy—Air Rescue personnel load a helicopter into the spacious cargo hold of a Fairchild Packet.

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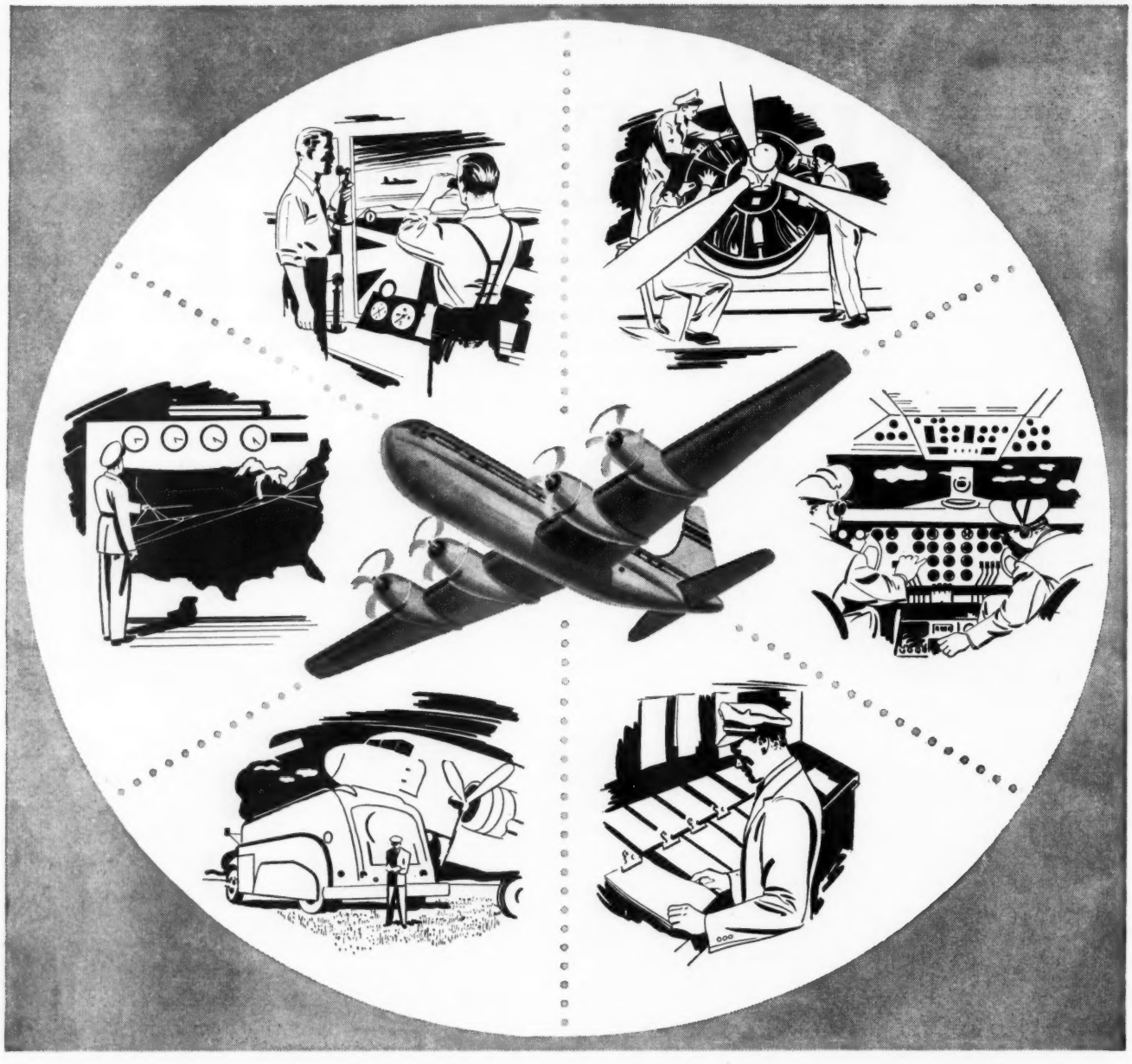

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Specific examples are... the A-12 Gyropilot* which provides precise flight control and makes flying smoother and more comfortable for airline passengers ... the Automatic Approach Control, which in Sperry's original planning anticipated airlines' weather, smoke and fog problems and which now operates through the Gyropilot to bring sky giants safely down to the runway... the Engine Analyzer which detects engine irregularities before they can become serious.

Sperry is constantly planning equipment and flight instruments that look ahead to tomorrow's aviation needs while helping to solve today's aviation problems.

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Carrier Off—Sullivan Quits

Navy appeals for reconsideration of the cancellation order ending work on its 65,000-ton super-carrier, the USS United States (CVA-58), apparently fell on deaf ears in the Pentagon and White House last week. Congressional leaders indicated they would not take up the cudgel for the super-carrier.

Work on the super-carrier was halted abruptly by a curt, two-sentence order from Defense Secretary Louis Johnson after the keel of the carrier had been laid at Newport News a week earlier. Johnson's order cancelling the carrier came as a rude surprise to the Navy since neither Navy Secretary John L. Sullivan nor Chief of Naval Operations Admiral Louis Denfeld were informed of the order before Johnson made it public. Other high ranking Naval officers were standing by at Johnson's request to offer a detailed presentation on the super-carrier to the defense chief, supposedly for consideration in his decision.

Following the carrier cancellation, Navy Secretary John L. Sullivan submitted his resignation to President Truman and wrote a stinging letter to Johnson, noting that the cancellation decision had been made while discussions on the matter were still pending between himself and Johnson.

Sullivan also wrote:

"I am deeply disturbed by your action which, so far as I know, represents the first attempt ever made in this country to prevent development of a powerful weapon. The conviction that this will result in a renewed effort to abolish the Marine Corps and to transfer all Naval and Marine aviation elsewhere adds to my anxiety.

"However, even of greater significance is the unprecedented action on the part of a Secretary of Defense in so drastically and arbitrarily changing and restricting the operational plans of an armed service without consultation with that service. The consequences of such a procedure are far-reaching and can be tragic."

Two to One Vote

As accurately as can be determined through the fog of administrative censorship surrounding the carrier cancellation, Johnson made the decision after receiving written recommendations individually from Gen. Omar Bradley of the Army, Gen. Hoyt Vandenberg of the Air Force and Admiral Denfeld. Johnson, in effect, counted the ballots and announced the result. There was no specific meeting of the Joint Chiefs of Staff to discuss the carrier's fate. It is understood that Bradley and Vandenberg voted against the carrier with Denfeld, of course, voting for it.

This two to one vote against the Navy upset the previous balance of power in the Joint Chiefs of Staff. Testimony before the House Appropriations Committee recently revealed that in earlier discussions of the Navy's carrier fleet in connection with the fiscal 1950 budget, Bradley and Vandenberg had voted together for six large carriers (Midway and Essex class). Denfeld and Admiral William Leahy, then chairman of the JCS, voted for nine carriers. Former Defense Secretary James V. Forrestal resolved the deadlock by giving the Navy eight large carriers.

Loss of Leahy's vote and the switch from Forrestal to Johnson have left the Navy on the short end of the Army-Air Force combination in JCS decisions.

Cancellation of the carrier marked the culmination of a series of severe blows dealt Naval aviation. Congress recently refused to increase Naval aircraft procurement funds above the 843 new planes authorized in the President's budget and also refused to restore a $36 million research and development slash that will halt all Naval aircraft experimental prototype development during the next fiscal year. The research cut means delay of four aircraft projects already begun for at least a year and indefinite delay for five other experimental aircraft.

Costs Detailed

Cost of cancelling the super-carrier was estimated at about $9 million, the amount of money available for the project out of fiscal 1949 funds. Another $43 million was scheduled for the super-carrier in fiscal 1950 funds. Total cost of the ship was estimated at between $188 and $225 million, not including the aircraft it would require.

The super-carrier has been a center of controversy ever since the Navy disclosed its plans for building the prototype in 1946. It was vigorously opposed by the Air Force as a Navy encroachment on the primary USAF mission of strategic bombardment. The carrier project was never specifically approved as such by Congress although the House Armed Services Committee last year approved a switch in Navy funds from building missile vessels to the carrier.

Argument also raged over whether the Joint Chiefs of Staff had approved the super-carrier. Navy said JCS had approved but former USAF Commander Gen. Carl A. Spaatz submitted a letter to the Senate Armed Services Committee denying that he had ever approved the super-carrier while he was a member of the JCS.

Cancellation of the super-carrier was generally interpreted as a step toward limiting the Naval air service to its JCS-assigned primary role of anti-submarine warfare and fleet support and curbing any possibility of its supporting the USAF in strategic air war. Navy will continue to operate eight large carriers with three more stored in mothballs.

All of the new experimental Navy carrier-based planes have been designed to operate from the Midway and Essex class carriers so that cancellation of the super-carrier will not necessarily alter the lines along which Naval aircraft development has been proceeding.

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AVIATION CALENDAR

May 5-6—Annual conference on air transportation, sponsored by School of Aeronautics, Purdue University, Lafayette, Ind.

May 5-6—Purdue University School of Aeronautics air transportation conference, Lafayette, Ind.

May 8—Annual southern states air carnival, Dannelly Field, Montgomery, Ala.

May 10—IATA traffic conferences, Europe.

May 11-13—IATA public relations conference, Oslo, Norway.

May 12-13—1949 forum, American Helicopter Society, Hotel New Yorker, New York City.

May 16-19—53rd annual meeting, National Fire Protection Assn., Hotel Fairmont, San Francisco.

May 17 — IATA technical conference, Switzerland.

May 19-21—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Detroit, Mich.

May 21 — Aviation progress exposition, Baltimore Municipal Airport, Baltimore, Md.

May 22—Airport Open House at Wold-Chamberlain Field, Minneapolis.

May 23-26—Eighth national conference, Society of Aeronautical Weight Engineers, Inc., Biltmore Hotel, Dayton.

May 24-27—Second joint conference of IAS, Royal Aeronautical Society, Hotel Astor, New York City.

May 26—IATA executive committee, Montreal.

May 26-27—Annual meeting, Society of the Plastics Industry, Edgewater Beach Hotel, Chicago.

May 27-30—Annual convention, Women's National Aeronautical Assn. of the U. S., Chase Hotel, St. Louis, Mo.

May 28-30—National Negro Aviation Convention, Bleuthenthal Field, Wilmington, N. C.

May 31-June 4—AWA annual convention, Statler Hotel, Wash., D. C.

June 2-5—Mississippi Goodwill Air Tour, Jackson, Miss.

June 3-12—Sixth annual Michigan Aviation week.

June 4-5—All-Woman Air Show, Amelia Earheart Field, Miami, Fla.

June 4-5—Fourth annual air fair and industrial exposition, Shawnee, Okla.

June 7—Third ICAO assembly, Montreal.

June 16-17—Mid-year meeting, Aviation Distributors and Manufacturers Assn., Broadmoor Hotel, Colorado Springs, Col.

June 17-18—Annual Ohio aviation clinic, Bowling Green State University.

June 20-24—AIEE, summer general meeting, New Ocean House, Swampscott, Mass.

June 26-27—NAA 27th annual national convention, Akron, Ohio.

June 27-29—Formal dedication of Naval Ordnance Laboratory aeroballistics division, followed by five half-day technical sessions, White Oak, Silver Spring 19, Md.

July 2-10—National soaring contest, Harris Hill, Elmira, N. Y.

July 10-13—Annual meeting, Natl. Assn. of University Administrators of Aviation Education, Kent State University, Kent, Ohio.

Sept. 6-8—Annual spark plug and ignition conference, sponsored by Champion Spark Plug Co., Hotel Secor, Toledo, Ohio.

PICTURE CREDITS

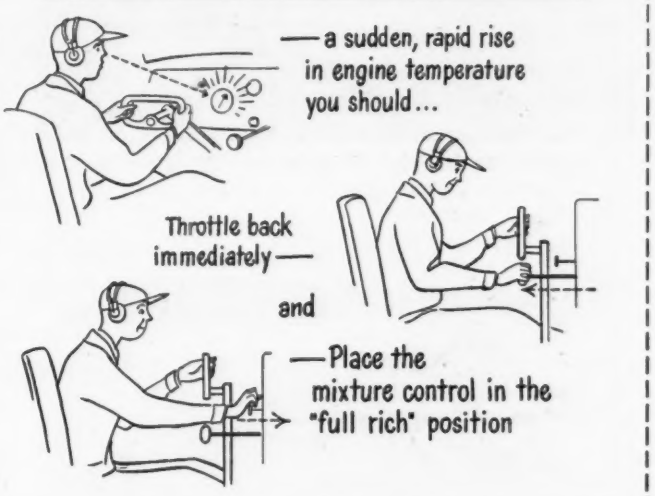
13, 32—U. S. Navy; 16—USAF; 19, 20, 21—Crash Injury Research.

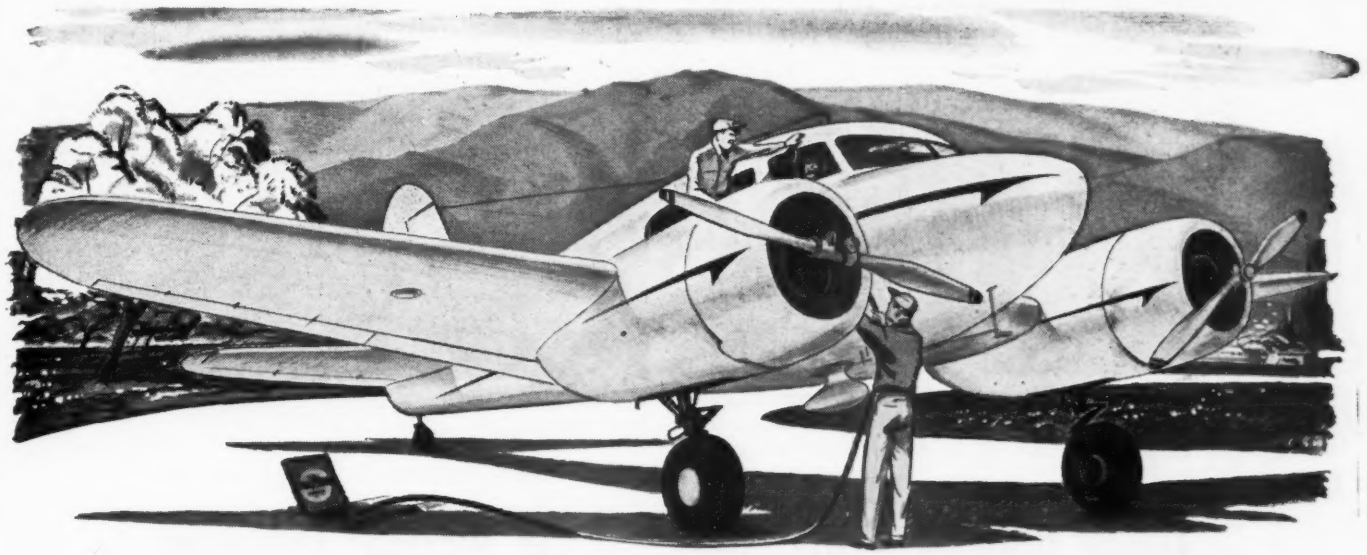
PLANE FAX

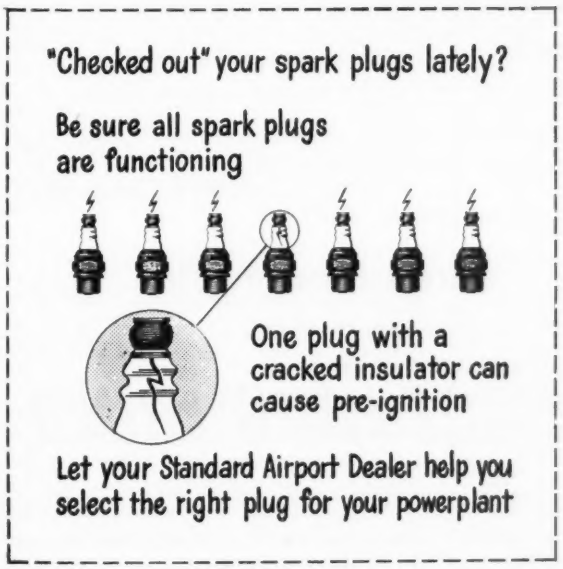
A page of service tips for private flyers and fixed-base operators

How to reduce pre-ignition

Low grade fuels encourage pre-ignition—and that often causes damaged pistons and engine failure. That's why it's so important to use only high octane Chevron Aviation Gasoline. This premium-quality fuel is scientifically blended for even combustion and peak performance under all flight conditions. That means fast starts, easy warm-up, extra power and dependable performance at every altitude.


At the first symptom of pre-ignition—
—a sudden, rapid rise in engine temperature you should...
Throttle back immediately—
and
—Place the mixture control in the "full rich" position




"Checked out" your spark plugs lately?
Be sure all spark plugs are functioning
One plug with a cracked insulator can cause pre-ignition
Let your Standard Airport Dealer help you select the right plug for your powerplant

"We take better care of your plane"

Good spark plugs fight pre-ignition

Proof of a good spark plug is in its ability to operate at high engine output. Atlas Champion Aircraft Spark Plugs resist overheating which can result in pre-ignition and detonation. That's because they have a special insulating material, the finest known to ceramic science. Your Standard Airport Dealer can tell you the full story of Atlas Champions.

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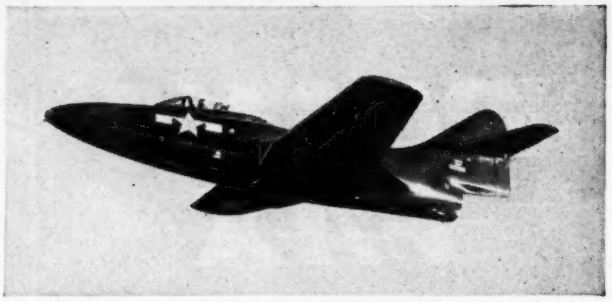
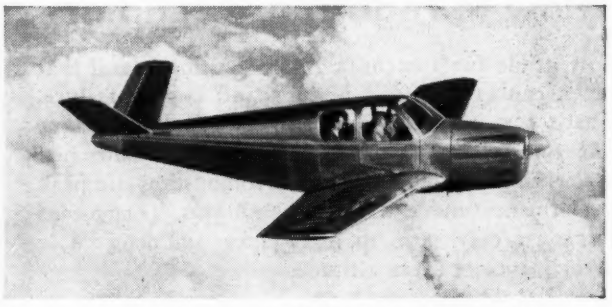
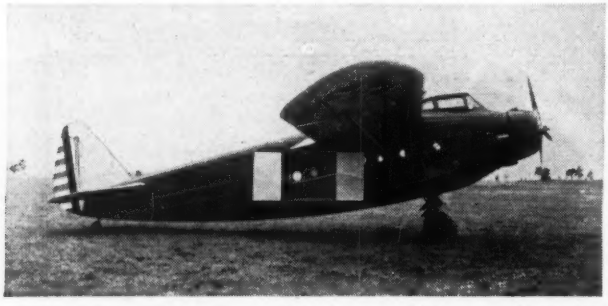


the FF-1. Latest, deadliest Grumman is the F9F-2 Panther, a 600-m.p.h.-plus turbo-jet Navy fighter.

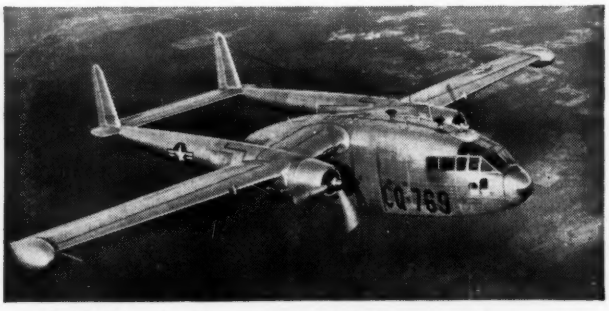
FIRST PLANE built by Walter H. Beech was his "Travel Air" in 1925. Today the Beechcraft "Bonanza" is famous for



setting a world's distance mark for light planes—4957 miles non-stop from Honolulu to Teterboro.



FAIRCHILD AIRCRAFT'S original cargo ship was the F-95, built in 1934. Today's Fairchild C-119 "Packet" can haul



a payload of 31,400 lbs., or carry 42 fully equipped troops or 38 litter patients, at 266 m.p.h.

These pioneer craft made these planes possible

(and so did *aluminum!*)

It's a fact that today's super-performers were born of knowledge gained while building and flying those faithful ships of yesterday.

Also helping to make them possible is *aluminum.* The aircraft industry has found that aluminum can economically deliver the combination of strength and lightness that modern aircraft *demand.*

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NEWS DIGEST

DOMESTIC

Endurance flyers Bill Barris and Dick Reidel landed their Aeronca Sedan at 2:46 pm. EST, Apr. 26, after staying aloft for 1008 hr. 2 min. to smash the former mark of 726 hr. The pair landed at Fullerton, Calif.

Atlantic Airlines petitioned Civil Aeronautics Board to reconsider its denial of Atlantic's application to establish "day coach" air service in the Middle Atlantic area. Company based its plea on public acceptance and Board approval of aircoach service, an idea Atlantic's President S. J. Solomon claims to have originated.

American Assn. of Airport Executives annual meeting in Oklahoma City drew over 300, largest turnout since before the war. Members heard Civil Aeronautics Administrator D. W. Rentzel and Bill Odom, noted distance flyer.

Capital Airlines reelected J. H. Carmichael president at annual meeting in Washington, D. C. Other officers reelected: Raymond G. Lochiel, vice president and treasurer; Robert J. Wilson, vice president, personnel and properties; J. B. Franklin, vice president, operations; James W. Austin, vice president, traffic and sales; and Hayes Dever, secretary. Reappointed were R. P. Wright, assistant treasurer, and Charles H. Murchison, chairman of the executive committee of the board of directors.

FINANCIAL

Republic Aviation Corp. reports net income of $254,055 for first quarter of 1949, after provision for Federal income tax. Sales were $9,706,107. Preceding year income was $1,282,558 with sales of $14,374,928.

American Airlines declared regular quarterly dividend of 87½ cents on corporations's $3.50 cumulative convertible preferred stock, payable June 1 to stockholders of record as of May 16.

FOREIGN

BOAC Constellation set new flying record of 56½ hr. between London and Sydney. Plane's flying time was 43 hr. 28 min.

Dutch aircraft company merger of Fokker, Aviolanda and De Schelde into United Netherlands Aircraft Company Fokker was abandoned at the eleventh hour, apparently due to difficulty in bringing in assets. Companies will continue to operate separately, although a certain amount of cooperation is planned.

INDUSTRY OBSERVER

►Douglas Skyrocket (D-558-II) will complete acceptance tests next month and begin supersonic research flights under Navy and NACA sponsorship in early summer. Skyrocket is expected to push well beyond Mach 1.5 before year's end. Bell X-2 is expected to get its long-delayed Curtiss-Wright rocket engine late in 1949 and be ready for initial flight testing early in 1950. X-2 is scheduled to hit Mach 2 during 1950.

►Air Force will take delivery on the Convair XC-99, six engine transport, early this month. Giant transport has been undergoing company flight tests at Ft. Worth after minor modifications and installation of a double tandem landing gear similar to that now on the B-36 series.

►Among Naval aircraft prototypes delayed indefinitely by Congressional slash in Navy research funds is the 100,000 lb. carrier-based jet bomber, Navy's best bet to compete with the Air Force in atomic bomb delivery. Now in design competition stage, the giant Navy bomber probably will be roughly similar to the Boeing B-47 in general configuration, power and size. Navy delivery schedule for 1951 now calls for 1071 new planes, with 993 to be delivered in 1952.

►Argentine Aeronautical Institute at Cordoba is working on designs for a four-engine combination freight and passenger transport and a twin-engine feederliner. Institute employment is now at 6000 for production program concentrated on the Colibri trainer and Calquin twin-engine attack bomber.

►Royal Air Force has picked the Canadian-designed de Havilland Chipmunk as primary trainer. Initial order for $5 million will be handled by de Havilland's plant at Chester, England.

►Australian National Airways has placed an $800,000 order for three Bristol Freighters. ANA will retain demonstration model Freighter that has been on tour in Australia and take delivery on two more before year's end. Freighter carries 11,700-lb. payload.

►Quantas Empire Airways has fitted a Lancastrian as a flying maintenance shop for quick emergency servicing along its Sydney-Karachi route. Lancastrian will carry a spare Constellation engine, parts and a maintenance crew. Flying maintenance shop is aimed at overcoming dollar shortage that has made it impossible for BOAC and Quantas to stock spare Wright engines along Asiatic routes.

►Fairey Clyde Aviation Co., Australian subsidiary for Fairey Aviation Co. in England, is canvassing potential users of helicopters in Australia and New Zealand with eye to building suitable type for the local market. British parent firm makes the Gyrodyne helicopter.

►A. V. Roe of Canada expects to test fly its XC-100 twin-jet night fighter before year's end. Canadian firm plans to compete with U. S. manufacturers for USAF orders as well as supplying RCAF with the new night fighter, specially designed for Arctic operations.

►Cornell Aeronautical Laboratory next fall will get one of the original Bell X-1s for special flight testing. Plane will go to Buffalo for special instrumentation, then turned over to Cornell. Flights will be made at Muroc AFB with Cornell test pilot at controls.

►A-F Helicopters, Inc., Burbank, Calif., is winding up a 90-day contract with TVA under which a Bell 47 was used for power line patrol. Copter rescued passengers of a twin-engine Cessna that crashed in Tennessee mountains.

►Hamilton Standard Propeller division, United Aircraft Corp., is entering its first non-propeller development program in recent years with a highspeed aircraft refrigerating equipment project. The system now under development is for aircraft skin cooling, as distinguished from cockpit refrigeration.

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AVIATION WEEK

May 2, 1949

Nonskeds Take Their Case to Congress

While still hoping for reprieve of CAB 'death sentence,' lines start to sell planes.

The nation's "large irregular" operators are still clinging to the hope that influential members of Congress will persuade the Civil Aeronautics Board to stay its recent "death sentence" revision of the nonscheduled exemption (AVIATION WEEK, Apr. 25).

While nonsked representatives were presenting their case before the Senate Interstate and Foreign Commerce Committee, investigating the certificated airlines' finances, the jittery independents were not ignoring the practical aspects of their precarious position. One index: More transport planes used for nonscheduled activities are being put up for sale.

▶**Viking Sells Planes**—One of the major transcontinental irregulars, Viking Airliners, Burbank, Calif., has sold its DC-3S in Latin America. Soon after the revision of the nonscheduled exemption was proposed by CAB late last year, officials of some large irregular carriers disclosed plans to sell their planes abroad if the new rules were actually promulgated AVIATION WEEK, Feb. 14).

The CAB crackdown last month sharpened a selling urge that began when cut-rate irregular operators using DC-3s on the transcontinental, Pacific Northwest-Alaska and New York-Miami-Puerto Rico routes found themselves driven to the wall because of competition from nonskeds using 45 to 50 passenger C-46s and DC-4s.

▶**$66 Coast-to-Coast**—One independent recently filed coast-to-coast C-46 tariffs of $77 for "luxury" accommodations and $66 for bucket seats. Fare on transcontinental nonskeds in the past has generally been $99, with a few offering tickets at $88. Regular fare by certificated carrier is $157.85.

James Fischgrund, chairman of the National Independent Air Carriers and vice president of Standard Air Lines, Long Beach, Calif., has been leading the effort to gain Congressional support for the nonskeds. Fischgrund's company is threatened not only by the revised nonscheduled regulations but also by a nearly complete CAB enforcement proceeding in which Standard is charged with conducting illegally an almost daily service between the East and West Coasts.

▶**Ask CAB Delay**—Following Fischgrund's testimony before the Senate Interstate and Foreign Commerce Committee, Sen. Edwin Johnson (D., Colo.), chairman of the group, wrote CAB Chairman Joseph J. O'Connell, Jr., suggesting that some way might be found to permit reasonable operations by large iregular carriers pending decision on their applications for certificates. Sen. Wayne Morse (R., Ore.) submitted a list of 24 questions to the Senate committee, requesting that they be forwarded to CAB for answers.

Among Morse's barbed queries: Has the Board considered that extensive aircoach service may so develop our national airlift and our national defense interests that care should be taken and every opportunity afforded to permit existence (of large irregular carriers) at least until their case (for a certificate) is heard? If aircoach service is practicable only between large cities, does the Board think it was intended in the Civil Aeronautics Act that service should be denied between large cities because it isn't practicable between small towns? Isn't it the function of subsidy to pay for such differences and not limit service which otherwise is in the public interest?

▶**Landis Testifies**—Former CAB Chairman James M. Landis testified before the Senate committee that large nonsked should not be granted unlimited operating authority at this time. But he agreed with Sen. Johnson that something should be done to enable the large irregulars to stay in business while their bids for certificates are being heard. The former CAB chairman said he would be surprised if one or two of the nonskeds were not certificated.

Sen. Johnson said he was impressed by Standard's statement that its CAB certification hearings will cost it $50,000 and that the company believes it is facing an adverse decision. Expense of prosecuting applications has kept a number of nonskeds from filing for certificates. Viking Airliners, which has sold its DC-3s, also withdrew its certificate bid from CAB's transcontinental aircoach service case because the financial outlay to prosecute it (with no assurance of success) is too great.

▶**Transcontinental Certificate Applicants**—Despite the bleak outlook, eleven carriers have asked to have their certificate applications heard in the transcontinental coach-type service case. They include: Airline Transport Carriers, Burbank, Calif.; Standard Air Lines, Long Beach, Calif.; Air America, Los Angeles; Trans Caribbean Air Cargo Lines, New York; California Eastern Airways, Oakland, Calif.; Twentieth Century Air Lines, Charlotte, N. C.; Trans American Airways, Burbank; Great Lakes Airlines, Burbank; Robin Air Lines, Burbank; Airplane Charter by Mercer, Burbank; and Coastal Air Lines, Newark, N. J.

Capital Airlines, the only certificated carrier which planned to become an applicant, reconsidered and instead will oppose authorization of new coach-type service. None of the carriers in the case has asked to carry mail.

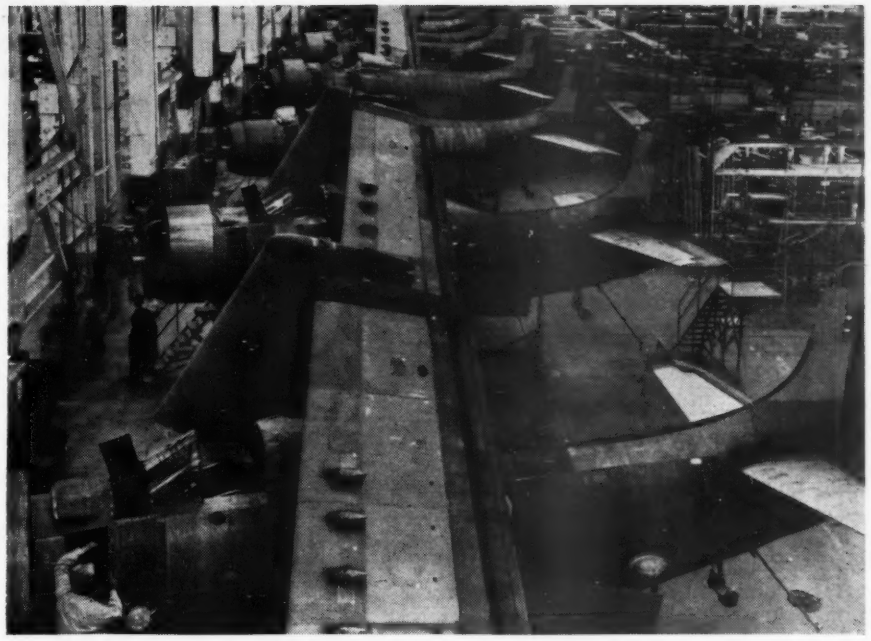
Hensley Director of Aviation Safety

CAA's reorganization, officially begun last Oct. 1, was finally getting close to realization, officials hopefully reported last week.

After a series of shifts and countershifts it appeared that final pattern would be much like the original blueprint for regional and Washington changes (AVIATION WEEK, Oct. 11, 1948.)

Contest between Ernie Hensley and Al Koch for aviation safety directorship was settled in favor of Hensley. Koch had expected to return to the safety job which he had formerly held, after Joe Marriott vacated it to return to his former post as CAA regional administrator on the West Coast. Hensley, who had been deputy under both Koch and Marriott, moved up to the top safety post, while Koch continued in the newly created job of director of program planning.

▶**Kemp Transferred**—Post of director of aviation development continued



HATCHING SKYRAIDERS

At Douglas Aircraft's El Segundo, Calif., plant, production of the big Navy attack-bomber Skyraider series will continue well into 1950. Various models, designated AD-1, AD-2, AD-3, etc. and designed for special operations, have been released for production. Still more advanced versions are anticipated. Main order of $50 million is being supplemented with additional orders. Powered with a 2700-hp. Wright R-3350-26WA engine, the bomber has a gross weight of more than 16,500 lb.

vacant after Sam Kemp, former deputy regional administrator at Atlanta, asked for a similar post as deputy regional administrator at Kansas City, rather than to remain in the new Washington post.

Possibility was seen that either John Geisse, long-time CAA consultant on personal flying, or H. Lloyd Child, assistant to the administrator for personal flying development, might get the assignment.

New office of aviation development has three principal divisions—aviation extension, flight information and aviation education. A fourth division, originally scheduled to be a part of development, aviation information (under Ben Stern), has since been placed in a separate category reporting directly to Administrator Delos Rentzel.

▶ **Regions Unchanged**—Regional administrator appointments continued unchanged in the regional reorganization. While regional readjustments were scheduled for completion May 1, it was understood that a topside bottleneck on specific appointments was holding up final announcements.

Management survey by Wallace, Clark Co., New York consultants, recently reported to Administrator Rentzel that 1000 CAA positions could be eliminated with benefit to the organization. Officials have not indicated how many of the posts recommended for elimination will be cut in the final reorganization.

AOA-PAA Merger Dealt Double Blow

Pan American Airways' proposed purchase of American Overseas Airlines is getting rough treatment in preliminary legal skirmishes.

The Civil Aeronautics Board's hearing on the deal is not scheduled until May 16, but late last month PAA suffered two setbacks. Prospects that the Board can reach a decision on the merger by the PAA-AOA target date of Sept. 15 have become increasingly dim.

▶ **Monopoly Alleged**—Much of the material dealing with Pan American's alleged monopolistic practices which former CAB Chairman James M. Landis wants introduced into the proceeding is relevant to the case, the Board ruled recently. About the same time, CAB public counsel and members of the Board's economic staff suggested a tentative two-carrier route pattern for North Atlantic operations if PAA acquires AOA. This plan would serve Pan American's round-the-world link and greatly strengthen TWA's international operations.

Landis, who is attorney for a group of AOA employes fighting the merger, has won the initial round in his attempt to introduce into the case material dealing with: 1. Alleged Pan American efforts to persuade Congress not to appropriate mail pay to permit trans-Atlantic operations by American Export Airlines and Latin American operations by Braniff Airways despite the fact that these services, competitive with PAA, had been certificated by CAB and the President; 2. Alleged PAA efforts to persuade the governments of Bolivia and Peru not to grant operating permits to Braniff; 3. Pan American's alleged denial of facilities to competing carriers or the imposition of excessive charges for their use.

CAB decided that requested data dealing with PAA's accounting techniques are not sufficiently relevant to the AOA acquisition case. (Pan American's financial statements show millions of dollars in revenue which the carrier believes is due it when CAB sets final mail rates. Other airlines do not list this unawarded mail pay, and Landis suggested that PAA's practice is misleading.)

▶ **Critical Issue Seen**—In supporting Landis' request for data dealing with PAA's alleged monopolistic practices, CAB public counsel said that one of the crucial issues in the proceeding is whether the proposed merger would result in creating a situation of dominance in international air transportation which is contrary to the public interest.

Pan American opposed the admission of material requested by Landis, asserting that the former CAB chairman was trying to convert the case "into a trial of all his grudges against PAA." The carrier again questioned the propriety of Landis' conduct in asking for documents from private CAB and CAA files "of which he gained knowledge in his official capacity of CAB chairman."

If the knowledge of documents in CAB's private files can be used for one client without pay, they can likewise be used for other clients for whom no such eleemosynary relationship is claimed to exist, PAA declared. (Landis says he is receiving no pay from the AOA employes he is representing.)

▶ **Route Realignment**—In their suggested plan for trans-Atlantic operations by only two U. S. flag carriers—PAA and TWA—CAB staff members proposed terminating Pan American's North Atlantic route at Moscow. PAA's link between Europe and India via Turkey, Lebanon, Iraq and Iran would be eliminated. Thus, its Pacific route would terminate at Calcutta, India, with no PAA Atlantic route connection at this point as at present.

This route realignment would make TWA the only American flag carrier operating to the Middle East. TWA would take over Pan American's service to Belgium, Turkey, Syria and other points. The plan would also reduce PAA's rights in the North Atlantic area from a permanent basis to a temporary basis.

Lights Squabble

Cutrell sees testing as function of Navigation Development Board.

Recommendation that high intensity approach light testing be taken away from Civil Aeronautics Administration sponsorship and placed under the Air Navigation Development Board was urged last week by E. A. Cutrell.

Cutrell is an American Airlines pilot, a recognized authority on approach lighting, and the Air Line Pilots Assn. representative on the Munitions Board Airport Lighting Evaluation Panel.

▶ **Denounces Tests**—Cutrell's recommendations were made in a bitter denunciation of the high intensity approach lighting test recently conducted under CAA sponsorship at Arcata, Calif. The airline pilots and CAA have been at odds over selection of the CAA-sponsored slope line approach light configuration as a standard for military and civil airport installations.

Details of Cutrell's criticism of the Arcata tests:

"It is believed that the obvious failure of the Arcata tests to come out with satisfactory conclusions regarding approach lights may be attributed to the lack of service tests by airline pilots under operating conditions.

▶ **Detailed Criticism**—"Cockpit cut-off has been stressed far beyond its importance insofar as pertains to approach lights and low visibility approaches.

"Roll guidance by a configuration of approach lights has been a highly important theory in the testing and evaluation at Arcata whereas it should have been completely discounted except perhaps in considering threshold and runway lights. The theory that a row of approach lights doesn't give directional guidance is absurd and the airline pilot cannot believe that such a gross misconception can be sold to many practical minded people.

▶ **Intensity Factor**—"The single center line row of approach lights tested at Arcata was not comparable in intensity, number of lights or texture to the slope line system tested there. The center line row was composed of 30 500-watt lamps with red filters; the slope line system 570 500-watt lamps without red filters. The red filters reduced the candle power of the single row lights by 72 percent.

"The slope line system had 67 times as much light as the center row system. Therefore, comparable tests of the two systems are meaningless. Factual data from the Arcata tests should be further discounted since test conditions are foreign to scheduled operating conditions.

▶ **Wrong Planes**—"Most data was taken using obsolete aircraft, B-17 and C-47. Airline fleets are principally composed of Constellation, DC-6, Convair, Martin 2-0-2 and DC-4 types.

"The Arcata field is located away from lighted areas. Most commercial airports have a variety of conglomeration of lights in their vicinities which require approach lights to be instantaneously and positively recognizable from other lights in the area. Flashing or condenser discharge lights are highly praised by scheduled pilots for fulfilling this necessary requirement.

"Arcata has principally one type of weather condition, fog which rolls in from the ocean which is not comparable to the many varieties of smoke, fog, rain, snow, windy frontal and other conditions found in routine scheduled flying.

"Criteria established for the Arcata tests require that pilots rely completely on approach lights for contact flight. Airline pilots do not completely leave instruments until the runway is in visual contact and landing assured. Safety dictates the latter technique.

▶ **Question Pearson**—"Outside observers of the Arcata tests question the advisability of a member of the Arcata administrative panel being also a proponent and advocate of a particular lighting system. Mr. Pearson, (H. J. Cory Pearson of CAA) chairman of the panel, sponsors the slope line systems.

"The Arcata test program considered only straight-in approaches. Air traffic and wind conditions require more circling than straight-in approaches by scheduled pilots; hence, visual aids must be considered in the light of this operating viewpoint."

Plane-Leasing Plan Turned Down by RFC

Reconstruction Finance Corp. has turned down Convair's original proposal for an RFC-financed equipment company to buy planes for lease to airlines, but negotiations on a revised plan are still underway, it was disclosed by Harvey Gunderson, RFC director, in testimony before the Senate Interstate and Foreign Commerce Committee.

Convair, meanwhile, moved ahead with the project, redesignating it Airfleets, Inc. (original name: Convair Equipment Corp.), and announcing that its home office would be Albuquerque. New Mexico's favorable corporation tax laws influenced the location.

▶ **CAB Concurs**—"An examination of the original proposal by (RFC) and the Civil Aeronautics Board . . . indicated that the total costs to the airlines . . . would have been high," Gunderson reported. CAB Chairman Joseph O'Connell concurred in his testimony. It is understood that Convair, through its subsidiary, planned to lease $340,000 Convair-Liners for a flat rental of $9800 per plane per month, plus a utilization fee based upon actual flight hours per month. CAB and RFC, it was indicated, are aiming to cut down this cost to the airlines.

Gunderson also hinted that RFC looks unfavorably on a loan to Airfleets covering 100 percent of its aircraft purchases, and would go no further than a loan amounting to 60 to 70 percent of the purchase price.

Sales Drop

First quarter 1949 personal airplane shipments totalled 754, valued at $3,607,000 Aircraft Industries Assn. reported last week, as compared to 1450 in the first quarter of 1948.

Cessna Airplane Corp. went into the lead in the closely contested sales race, with Piper Aircraft taking first place in March sales, 121 to 115. Piper was still ahead for the quarter, 235 to 214.

Aeronca was third with 40 planes for March, 76 for quarter. Other companies reporting: Ryan 37 for March, 64 for quarter; Beech, 19 for March, 58 for quarter; Luscombe, 25 for March, 61 for quarter; Beech, 19 for March, 58 for quarter; Bellanca, 4 for March, 17 for quarter; Sanders (Ercoupe) 7 for March, 14 for quarter; TEMCO, 6 for March, 9 for quarter; Taylorcraft, 2 for March, 6 for quarter.

March shipments included 261 four place airplanes, and 115 two placers, with total dollar value of $1,668,000.

Jordan Resigns

William C. Jordan resigned last week as president of Curtiss-Wright Corp. The revamped board of directors (AVIATION WEEK, Feb. 7), confirmed in office at the annual stockholders meeting, elected Paul V. Shields to a new post of "chairman as chief executive officer." Announcement of the new president was expected shortly.

Shields, who was chairman of the executive committee, now becomes operating chief, although he is neither chairman of the board nor president.

Guy W. Vaughan, longtime C-W chief, retired as a director and chairman of the board of Curtiss-Wright Corp., but was reelected a director of Wright Aeronautical Corp., C-W's engine-building subsidiary. He continues to serve the corporation as a consultant.

Jordan also resigned as president of Wright Aeronautical and a member of its board of directors. His place on the board was filled by election of J. F. McCarthy, vice president and treasurer of Curtiss-Wright.

Four-Engine Transport Comparison

	C-124A	C-74	C-97A	DC-6A	C-121A	C-54/R5D
Engines	4-P&W R-4360-35	4-P&W 4360-49	4-P&W 4360-35A	4-P&W R-2800	4-Wright R-3350	R-P&W R-2000
Takeoff hp. per engine (BHP)	3,500	3,250	3,500	2,400	2,500	1,450
Gross wt. takeoff (lb.)	175,000	165,000	142,500	100,000	105,000	73,000
Landing (lb.)	160,000	160,000	124,000	85,000	89,500	63,500
Takeoff over 50 ft. obstacle (ft.)	4,390	4,500	4,300	4,150	4,130	4,190
Landing over 50 ft. obstacle (ft.)	3,340	3,360	3,850	2,750	2,880	2,790
Capacity payload (lb.)	50,000	50,000	43,000	30,000	21,200	20,000
Cargo volume:						
Main cabin compartments (cu. ft.)	10,450	6,500	4,460	4,160	2,480	3,325
Auxiliary compartments (cu. ft.)	1,150	.....	1,820	567	314	252
Total (cu. ft.)	11,600	6,500	6,280	4,727	2,794	3,577
Cargo density (lb./cu. ft.)	4.3	7.7	6.85	6.35	7.6	6.0
Cruising speed (max.) at takeoff weight (KN.)	218	229	253	244	265	190
At altitude (ft.)	13,600	10,000	20,000	19,900	23,000	17,000
Cruising speed at 10,000 ft at 60 percent normal power (KN.)	205	211	223	222	222	174

What 30-Day Airlift Takes

Douglas model exhibit in concourse of Pentagon compares cargo capacity of leading service transports.

How many four-engine transport planes does it take to airlift 4500 tons in an eight-hour day into Berlin for 30 successive days?

Last week out in the Pentagon concourse, a display of plastic transport plane models exhibited to National Military Establishment officials and anybody else who cared to look, the following comparison:

Douglas C-74, 60; Douglas C-124A, 62; Boeing C-97A, 67; Douglas DC-6A, 91; Lockheed C-121A, 126, and Douglas C-54 (currently standard on the airlift) 178.

Display and comparative figures posted with it were prepared by the Douglas Aircraft Co., based on standard figures supplied for all the planes represented.

Fuselage models all built to the same scale included the four engine planes named above, and also the Super C-47 Douglas design study and the old World War II standard C-47 transport. With the fuselage models were models of things they could carry, built to the same scale, including fighter planes, military trucks, field artillery, power egg nacelle assemblies and other cargo items. Fuselage models showed loading hatches, available cargo space, space occupied by crew, etc. Exhibit was labeled: "Phases in the Development of Military Transport Aircraft 1942-1949."

Other significant Berlin airlift comparisons shown with the models, in addition to performance characteristics listed in an accompanying table:

- **Payload** (tons per airplane per trip): C-74, 25; C-124A, 25; C-97A, 20; DC-6A, 14.9; C-121A, 10.6; C-54, 9.7.
- **Trips** (per 30 days): C-74, 5400; C-124A, 5400; C-97A, 6750; DC-6A, 9060; C-121A, 12,750; C-54, 13,800.
- **Flying Time** (hr. per round trip): C-97A, 2.4; C-121A, 2.4; DC-6A, 2.4; C-74, 2.7; C-124A, 2.7; C-54, 3.3.
- **Flying Time** (hr. per 30 days): C-74, 14,330; C-124A, 14,710; C-97A, 16,040; DC-6A, 21,744; C-121A, 30,080; C-54, 42,888.
- **Gasoline** (Gal. per 30 days): DC-6A, 7,420,000; C-54, 8,577,600; C-74, 8,725,000; C-124A, 9,000,000; C-97A, 9,950,000; C-121A, 12,600,000.
- **Total Men** (including crews and maintenance at 90 hr./month): C-97A, 2834; C-74, 2860; C-124A, 3112; DC-6A, 4084; C-121A, 4782; C-54, 5604.
- **Crews** (at 90 hr./month): C-74, 160; C-124A, 164; C-97A, 178; DC-6A, 242; C-121A, 334; C-54, 465.

Art Chester Killed In Racing Event

Arthur C. Chester, who shared with Steve Wittman the distinction of having participated in every National Air Race, was killed in a closed course event of the American Gold Cup Air Races near San Diego, Calif. He was flying his own Chester Special 190-cu. in. midget racing plane. Apparently he lost control of the plane rounding a pylon and crashed. His wife and young son witnessed the crash from the stands.

Art Chester was founder and president of the Professional Race Pilots Assn., which laid down the design rules for an entirely new family of small racing planes. Events confined to these rules were sponsored by Goodyear and Continental at Cleveland and Miami. Chester placed third in the Goodyear trophy event at the 1948 National Air Races and fifth in the 1949 All-American Air Maneuvers.

▶ **Barnstorm Pilot**—Chester was born Dec. 15, 1899, at Bowners Grove, Ill., of Polish ancestry, and received his pilot certificate from the Aero Club of America Sept. 8, 1921. He became a barnstorming pilot shortly thereafter and entered air racing in 1929, winning $100 in his OX-5 powered Travelair biplane. He participated in every National Air Race since and began designing his own planes in 1933, producing a continuing series of light, high-speed designs which, combined with his pylon skill, made him a substantial money-winner through the years.

He moved to Los Angeles in 1939 to work as a designer at North American Aviation. He was credited with much of the design of the North American NA-35 light training plane. Later he formed his own company for the production of propeller spinners for the NAA P-51 Mustang and other warplanes. More recently he had concentrated on the design and production of his small "Swee' pea" type racing planes.

▶ **NAA Life Member**—Chester was made an honorary life member of the National Aeronautic Assn. "for the design, construction and piloting of light-weight high-speed racing aircraft and the direction of safe air race competition."

Survey Reveals Executive Salaries

Executives in the aviation field who earned over $25,000 during 1948 are listed in a partial survey by AVIATION WEEK. Tabulation is not yet complete.

Salary details:

▶ **Boeing Airplane Co.**—William M. Allen, president, $51,700; Wellwood Beall, vice president, $32,100; Fred Laudan, vice president, $26,305; J. E. Schaefer, vice president, $25,670. Total 1948 outlay for salaries and fees of all officers and directors: $245,900.

▶ **Lockheed Aircraft Corp.**—Robert Gross, president, $68,277 (plus a retirement fund payment of $11,341); C. A. Barker, vice president, $52,781 (plus retirement payment of $11,724); Cyril Chappellet, vice president, $38,915 (plus retirement payment of $3950); Courtlandt Gross, vice president, $52,631 (plus retirement payment of $5632); Hall Hibbard, vice president, $38,615 (plus retirement payment of $4360); Herbert Ryker, vice president, $38,615 (plus retirement payment of $8746); Carl Squier, vice president, $38,615 (plus retirement payment of $7651): Total 1948 outlay for officers' and directors' salaries and fees: $452,826 (plus retirement payments totalling $58,-161).

▶ **Republic Aviation Corp.**—Mundy Peale, president, $59,033; Alexander Kartveli, vice president, $44,783; Thomas Davis, secretary-treasurer, $29,166. Total 1948 outlay for officers' and directors' remuneration: $186,107.

▶ **United Aircraft Corp.** — H. Mansfield Horner, president, $102,550 (plus incentive compensation of $35,000 and retirement payment of $7000); Leonard Hobbs, vice president, $72,800 (plus incentive compensation of $22,500 and retirement payment of $6668); Frederick Rentschler, chairman of the board, $103,750; Raycroft Walsh, vice chairman, $62,600 (plus incentive compensation of $15,000 and retirement payment of $7746). Total 1948 outlay for officers' and directors' salaries and fees: $900,022 (plus incentive payments totalling $52,829).

▶ **Wright Aeronautical Corp.** — Guy Vaughan, president, $33,134; R. W. Young, vice president, $25,668 (plus retirement payment of $1563). Total 1948 outlay for officers' and directors' salaries and fees: $136,752 (plus retirement payments of $4522).

▶ **Sperry Corp.**—Thomas Morgan, chairman of the board, $125,057 (plus $19,494 accrued under a salary adjustment plan); Thomas Doe, president, $81,280 (plus $12,-688 accrued); John Sanderson, vice president, $77,140 (plus $11,895 accrued); Harry Vickers, vice president, $76,600 (plus $11,-895 accrued). Total 1948 outlay for officers' and directors' salaries and fees: $530,656 (plus payments totalling $77,465 under salary adjustment plan).

▶ **Bell Aircraft Corp.**—Lawrence Bell, president, $56,125 (plus retirement payment of $16,243); Ray Whitman, vice president, $41,-000 (plus retirement payment of $11,323); Julius Domonkos, vice president, $30,000 (plus retirement payment of $3733). Total 1948 outlay for officers' and directors' salaries and fees: $214,856 (plus retirement payments of $42,614).

▶ **Fairchild Engine and Airplane Co.**—J. Carlton Ward, Jr., chairman of the board, $67,700 (plus $50,927 in bonuses); Lawrence Richardson, president (service started Apr. 1, 1948), $27,500 (plus bonuses of $8000); Myron Gordon, vice president, $40,000 (plus $8000 in bonuses); Richard Boutelle, vice president, $25,500 (plus $8000 in bonuses). Total 1948 outlay for officers' and directors' salaries: $239,517 (plus $94,427 in bonuses).

▶ **Reynolds Metals Co.**—R. S. Reynolds, chairman of the board, $81,709 (plus $64,-500 in bonuses); H. L. Charlton, director, $35,319 (plus $4500 in bonuses and $7030 retirement payment); R. S. Reynolds, Jr., president, $41,033 (plus $42,000 in bonuses); J. Louis Reynolds, vice president, $21,729 (plus $29,000 in bonuses); I. P. Macauley, vice president, $25,160 (plus $25,000 in bonuses); M. M. Caskie, vice president, $39,009 (plus $40,000 in bonuses); Basil Horsfield, vice president, $25,428 (plus $5000 in bonuses); W. G. Reynolds, vice president, $28,890 (plus $32,500 in bonuses); Walter Rice, vice president, $30,480 (plus $25,000 in bonuses); D. P. Reynolds, vice president, $28,950 (plus $32,500 in bonuses); C. F. Manning, vice president, $19,263 (plus $13,000 in bonuses); R. P. Patterson, vice president, $37,540. Total 1948 outlay for officers' and directors' salaries and fees: $574,765 (plus $365,000 in bonus payments).

▶ **Warner Aircraft Corp.**—Reported no aggregate earnings of over $25,000. Top earnings were: W. O. Warner, general manager, $18,000; L. A. Faunce, $10,000; L. A. Majneri, chief engineer, $14,400; W. J. Jarvie, secretary-treasurer, $10,000.

Airport Plan Report

Expenditure of $1,115,300,000 for U. S. airports is asked in the CAA 1949 National Airport Plan just announced.

Of this amount $510,600,000 would be Federal funds and $604,700,000 would be provided by local project sponsors to build 2794 completely new airports and improve or develop 2183 existing fields.

Federal expenditure is dependent on appropriations by Congress and the most important projects in the plan will be programmed for construction on a basis of funds allotted, CAA said.

Breakdown of the 1949 plan shows the following projects:

• **Class IV** and larger airports, 24 new, 543 development.

• **Class III** airports, 165 new, 443 development.

• **Class II** airports, 474 new, 574 development.

• **Class I** airports, 1777 new, 581 improvement.

• **Seaplane** bases, 291 new, 50 improvement.

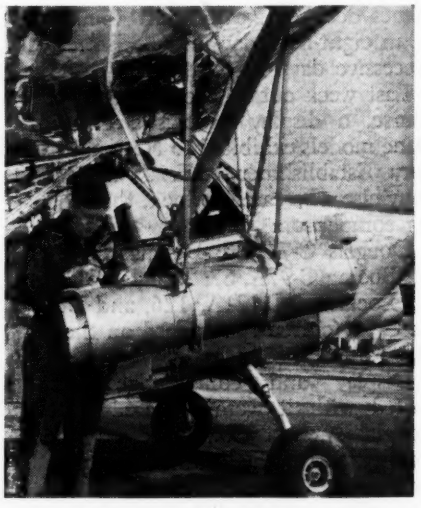
• **Heliports,** 63 new, 2 improvement.

A summary of existing airports as of last Dec. 31, shows a total of 6414 fields. This includes 410 at which scheduled air service is in operation and 280 other fields designated for scheduled operations but where scheduled service is not now provided.

A status report on airport funds previously allocated, as of last Dec. 31 shows:

• **Program provided** for 1242 projects at 1034 airports at estimated federal cost of $103,538,104 and sponsor contribution of $112,341,571 or total cost of $215,879,675.

• **At year's end,** Grant offers for 608 projects totalling $62,865,681 or 61 percent of available funds, had been authorized by the administrator. Sponsors had accepted 536 of these grant offers, amounting to 52 percent of available federal funds. Construction had been started or completed on 491 of the 536.



VERSATILE L-13A

Two little known uses of the AFF's Consolidated-Vultee L-13A liaison plane are for laying wire for field telephones, and for dropping cargo containers to ground troops. Smaller picture shows wire-laying container attached to same type shackle which carries the 300-lb. cargo containers in larger photo. Alternately the shackles can also carry and drop 300-lb. bombs, and have also been used to carry a public address system for amplifying messages to ground troops.

What It Costs to Use a Lightplane

Economy and utility of personal aircraft are cited in report on one year's operation of two-place Luscombe.

By Eugene W. Norris

(Editor's note: Mr. Norris, now Washington representative of Flight Safety Foundation, previously was vice president-engineering of Luscombe Airplane Corp., and before that director of technical services for Aircraft Industries Assn. The following article is based on his paper presented Apr. 29 at the Institute of the Aeronautical Sciences meeting at Wichita.)

A year's operational experience just completed with my 90 hp. (Luscombe) two place all-metal personal plane, in which I traveled 36,000 miles through 31 different states, has brought a highly favorable conclusion regarding the economy and utility of today's personal airplane under today's operating limitations.

▶ **Typical Operation**—Plan was to conduct a typical plane operation for 12 months, including full exposure to all those economic and utility factors which had been either praised or damned. This included not only the airplane itself but factors on the ground which influence cost, convenience or utility of air travel.

Conclusions and recommendations are based on one man's experience for one year with one airplane. Additional similar records would permit more conclusive presentation.

A realistic attitude toward the personal plane's current limitations and advantages should encourage broader acceptance by those who profitably can utilize today's airplane today. Concentration upon solution of known problems is an inescapable responsibility of all who have the interest of personal aviation at heart.

▶ **Utility Rate**—Although many users of personal or business airplanes, in a recent AIA survey, report dissatisfaction with high cost of ownership and operation, such dissatisfaction is confined to those who cannot or do not utilize the airplane sufficiently to bring the indirect cost per mile into the reasonable range.

For example, utilization rate for the author's two place airplane was 36,000 mi./yr. for a total indirect cost of 3.6 cents/mi. If utilization rate had been 15,000 mi./yr. indirect cost would have been 8.65 cents/mi.—an increase of 240 percent. It is significant that those who do utilize their aircraft sufficiently on bona fide business travel invariably consider operating costs reasonable and justified. Many see an actual cost saving over previously used transportation.

Several manufacturers have done an outstanding job of developing use of personal aircraft in business for executive transport, sales, delivery, and special purposes where its economy, speed and flexibility can be used advantageously. However greatest effort has been expended upon the four place airplane with insufficient attention to profitable applications for two place models.

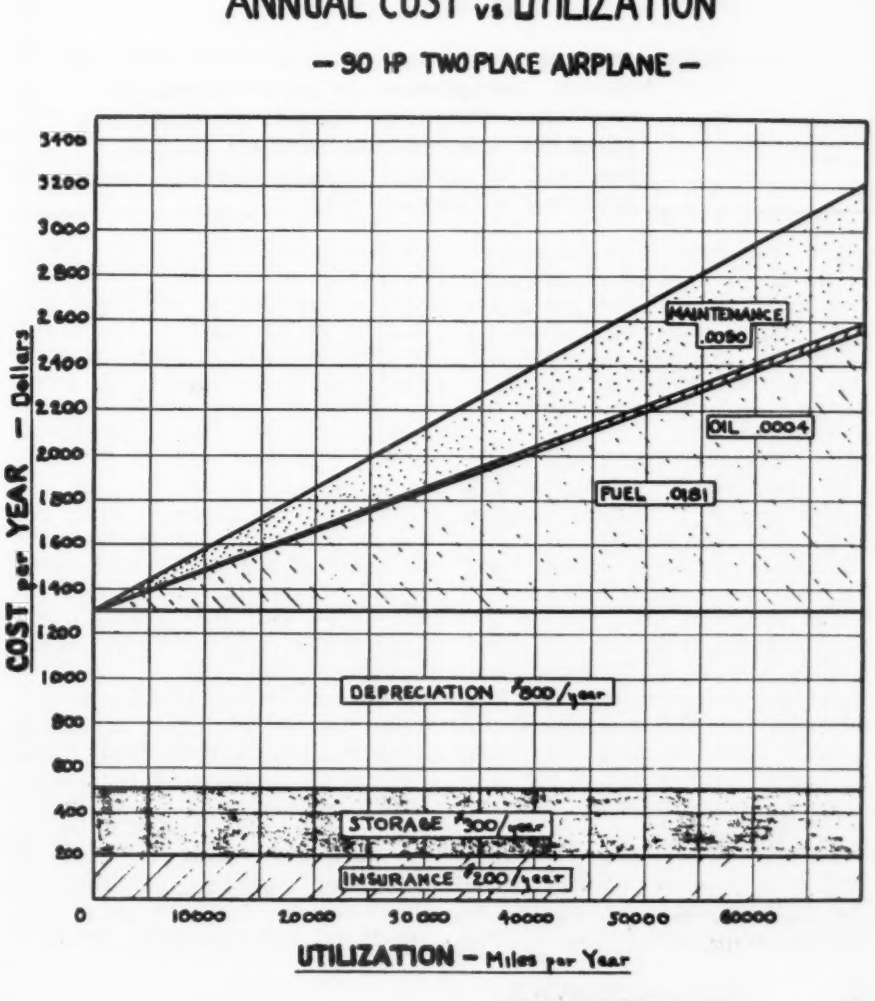
▶ **More Economical**—For lighter loads and shorter distances, today's two place airplane becomes economically justifiable for business travel at a lower annual utilization rate than the four place model. Since frequency of short distance individual travel is greater than long distance group travel it seems evident that the potential business market for the less costly vehicle would offer interesting possibilities.

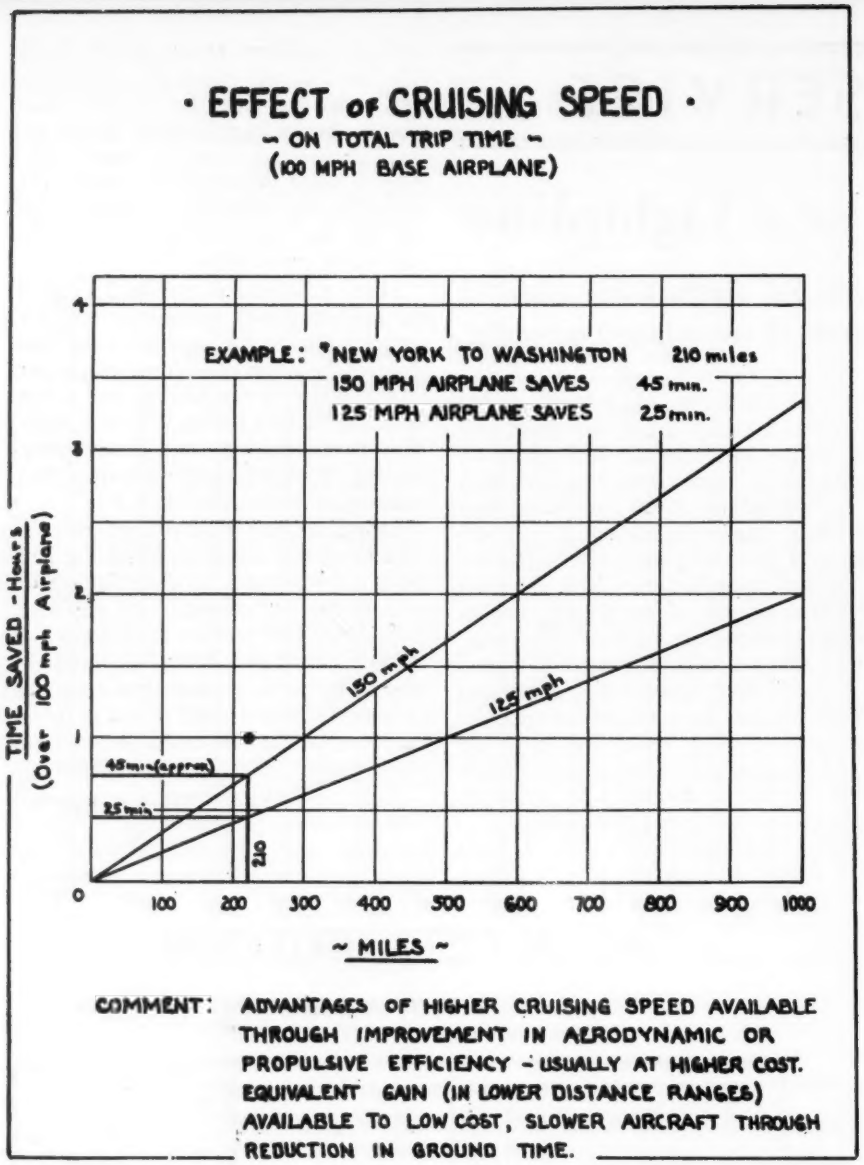
Many problems of personal aviation are associated with ground factors. Experience during the year indicates time required between downtown origin and takeoff and between landing and downtown destination averaged 45 min. each. This covers driving time, loading, unloading, preflight check, warmup, taxi, securing, checkin, checkout, etc.

Significance of ground time varies in trips to various distances. With the 100-mph. airplane used, on a 150-mile trip, pilot spends 50 percent of the trip time in flight and 50 percent on the ground.

On a New York to Washington flight of 210 miles, if ground time could be reduced to 30 min. total by use of urban flight strips, the 100-mph. personal airplane could match DC-6 schedules.

AVIATION WEEK recently reported airport commuting time at 60 cities averaged nearly 25 min. It was suggested new super-highways or express-





ways be constructed to permit substantial reduction. Personal aircraft pilots using airline terminals may use airline transportation when not overloaded, though this frequently means delay to meet time of a scheduled trip. Alternate taxis available on short notive are substantially higher.

▶ **Free Transportation**—Rental autos would contribute to solution of this problem but it is doubtful whether volume of business would justify the investment. A number of operators provide free station wagon transportation to and from town. This courtesy is a strong inducement for return business. In other cases airport personnel have offered free transportation in their own autos. Efforts in this direction indicate a healthy desire on the part of many operators to improve one of the most annoying, costly, and time-consuming ground factors.

▶ **Castering Gear**—Reduced landing speed would tend to emphasize advantages of the castering landing gear, already particularly well adapted to meet problems associated with the low-cost single strip urban facility. For certain types of operation the user could substantiate an increase in aircraft cost for the lower landing speed and cross-wind gear if he would have access thereby to the urban terminal facility.

Analysis of delays caused by weather showed that there were 13 delays of which two were one day or more and four caused cancellations. Time lost due to weather totalled 11 days with an estimated additional cost incurred of $94. Comparison of the days operated—110—with the days of operation intended—121—shows a 91 percent favorable weather factor.

▶ **VFR Standards**—It becomes increasingly important to develop equipment permitting realization of Visual Flight Rules safety standards by the average private pilot in single engine aircraft in all visibility conditions. This means, in order of importance: improved powerplant reliability, simplified instrumentation for control and navigation, lower minimum speed, hands-off stability, improved communications reliability, and ice prevention.

Maintenance experience for the year showed total actual cost of $190.32, including: seven periodic inspections with no airframe repairs, $42; seven periodic engine inspections costing $98, calling for $2.50 generator repairs and $15.82 magneto repairs; $22 radio repairs, and $10 miscellaneous repairs, including neutralizing acid spillage in battery compartment, $6.25, two battery recharges, $2.50, and removing wheelpants, $1.25. Simplicity of the all-metal airplane with fixed gear, fixed pitch metal propeller, no flaps, was a factor in low maintenance cost.

In addition there was added $30 for each 100 hr. of flight for the cost of the 600 hr. overhaul. Total maintenance cost amounted to 0.9 cents/mile.

▶ **Favorable Factor**—All-metal construction was a favorable factor in storage which was figured at $25 a month, and varied from hangar to tiedown. Additional cost of folding wings or roadable characteristics might be offset partially by savings in storage costs.

High percentage of loss claims in personal aviation in the past four years has resulted in increases in hull insurance to a point where cost for truly adequate coverage is extremely high.

Reasonable coverage for property and bodily injury liability is available for less than $50. Passenger liability adds $35 to $50 per seat.

Hull coverage (2½–10 percent deductible) for ground risks is figured at $3–4 per $100, and hull coverage in flight is an additional $8–12 per $100.

▶ **Adjust Rate**—Some individual owners in the lightplane field prefer to "carry their own" (flight hull insurance) and depend upon conservatism and capable operation to insure higher operating standards than those upon which underwriters base their rates. Some companies, however, do adjust rates to reflect an outstandingly good or outstandingly bad individual risk. Comprehensive coverage (5 percent deductible) on a $4000 airplane amounts to approximately $580/yr. or 23 percent of total cost of operation for 30,000 mi.

Improvement in insurance rates and consequent reduction in airplane operating costs can be influenced by the designer in reducing degree of skill and attention required for safe operation, simplified structure and system, and interim safety devices. Operating public can have the greatest immediate effect by self discipline, reducing reckless flying, checkouts in unfamiliar aircraft, and more emphasis on conservative operation. New type cross country training course also might influence an improved accident rate through emphasis upon normal operations for which the personal airplane is intended.

Example of how structure can absorb force of a crash: two occupants of this plane suffered only minor injuries because wing soaked up most of the impact force.

Seat belt broke, but it first checked pilot's forward movement. He was slightly hurt.

Design Crash Protection Into Lightplanes

Study of "survivable" mishaps gives basic knowledge which has been used to make occupants safer.

It is no accident that more people are walking away from private plane accidents.

They are surviving because some really effective crash protection features finally are being built into personal craft. This is now possible because after six years' work by Crash Injury Research and other agencies, designers have some solid—if incomplete—knowledge of what happens in a crash.

CIR, founded during the war as a government project and now administered by Cornell University Medical College, has studied more than 600 lightplane accidents. Studies show maximum protection would stem from planes designed with:

- **Aircraft structures** having higher crash energy absorbing ability to soak up as much impact force as possible before it hits occupants.
- **Progressive collapse** characteristics with occupants seated farther aft so there is more structure between them and the nose of the airplane.
- **Safer correlations** between minimum safe flight speeds and energy absorbing capacities of aircraft structures.
- **More rugged cockpits** with safety provisions—seats, belts, control wheels, etc. —which will hold up at least as long as the cockpit.
- **Cockpit tubing** designed to buckle outward, and stressed to prevent cabin collapse in turnovers.
- **Stronger safety belts,** seats, seat anchorage, and cockpit floors. Investigation has shown that 2000-lb. belts often break; CIR thinks 4000-lb. belts may be strong enough.
- **Stronger control wheels** designed to support the chest, and inertia locks on control columns to prevent forward movement of wheels during crashes.
- **Front seats** with pivoting backs which will swing forward out of head-range of persons in rear seats.
- **Lethal tube clusters** and instrument panels placed out of head-range. Instrument panels could be moved forward or passengers moved farther aft.
- **More rugged landing gear** with high energy absorbing characteristics. This would cut the number of spinal injuries.
- **Electrical system** impact circuit breakers to remove the hazard of fires after crashes.

In craft where it is difficult to move instrument panels out of head-range, CIR suggests locating heavy instruments where they are not likely to be struck by the head. The panel be constructed of a material which will absorb impact of head blows.

An alternative is to recess instruments and have them mounted so they will tear loose and fly forward out of range at impact.

To help prevent engines from being forced back to crush occupants, CIR recommends that the baggage compartment be placed between the cockpit and engine firewall.

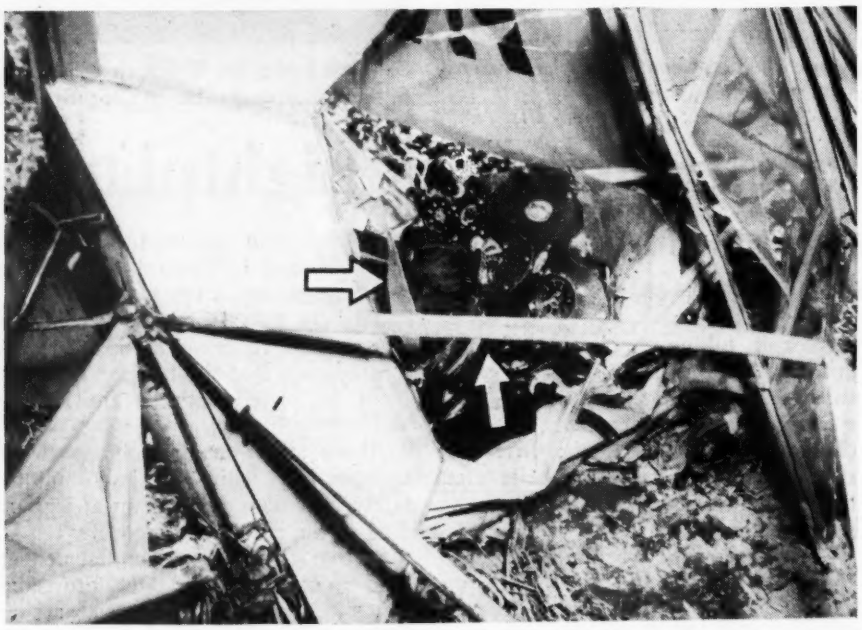
Above all, it urges engineers to remember that, while it is important for safety provisions to hold up at least as long as the cockpit, it is equally important that the cockpit be designed to hold up as long as the safety provisions —a condition which does not always exist in small craft.

▶ **Progress**—Although Hugh De Haven, CIR director, feels that his group has barely scratched the surface of the crash problem, he can point to a number of important changes in private planes which are a direct result of suggestions made by his group.

In 12 leading lightplane models, CIR recommendations have borne fruit:

- **Four** have progressive collapse characteristics.
- **Five** have occupants seated further aft.
- **Instrument** panels have been moved forward in five planes.
- **Stronger** landing gear with better shock absorbing qualities has been installed in seven craft.
- **Cockpits** in five planes are more rugged and designed with a stronger turnover structure.

Example of how good cockpit construction gives occupants maximum protection in crash: the pilot's safety belt held, and the surrounding structure remained almost intact.



How position in plane determines degree of injury: rear seat occupant (located by upper arrow) was slightly injured; person in front seat (lower arrow) was killed.

• **Danger** of head injury from instrument panels has been generally reduced in eleven models.

• **Safer** control wheels are in seven craft.

• **Five** planes have stronger seats, and four have backs of front seats designed to pivot out of head-range of rear passengers.

De Haven thinks aircraft manufacturers still are slow in capitalizing on CIR's suggestions.

"I realize," he says, "that they are not financially able to introduce radical design features to meet the crash problem. But some have been slow in adopting many minor improvements which could be made at relatively low cost. These alone would pay off tremendously in the number of lives saved each year."

He points out that even now in personal craft which provide hardly any crash protection over 50 percent of the occupants survive accidents where the plane is a complete washout.

"This percentage," he claims "would be increased almost incredibly if all light planes incorporated the minor changes suggested by accident-injury studies. People can take unbelievable punishment and fly again if given half a chance."

Although CIR's findings have permitted better understanding of the most obvious causes of injury in accidents, major development of crash protection engineering is stymied until better research facilities are available.

► **What Is Needed**—Multi-G acceleration-deceleration equipment is needed to determine human tolerance of force and the intensity and duration of forces encountered in crashes. Also, without better facilties, engineers cannot compare the crash energy absorbing ability of one type of structure against any other now used in small planes.

Until this equipment is available there can be no major advance in crash design of primary structures.

It is possible that research with these facilities will allow rating of future planes according to their energy-absorbing characteristics and protective value. CIR thinks this rating would condemn some of the structures now used in personal craft.

Although improved aircraft performance and stall warning devices will save many lives, and could make accidents proportionately less frequent, private flying still will not become generally accepted by the great majority of people while they remain convinced that death or critical injury is the price of a crack-up, crash investigators feel.

► **Misconception**—Until recently, the effectiveness of crash protection in aircraft was not appreciated because of a misconception that human beings could not survive the sudden deceleration encountered in abrupt crashes—even when the cockpit remained intact and they were held in place by means of safety belts.

Now, it is known that there is not a private plane built today that can stand impact forces as well as the human body—if reasonably supported.

Research has disclosed that the majority of individuals are killed in crashes because the aircraft collapses on them, or because they are thrown against some part of the cockpit structure.

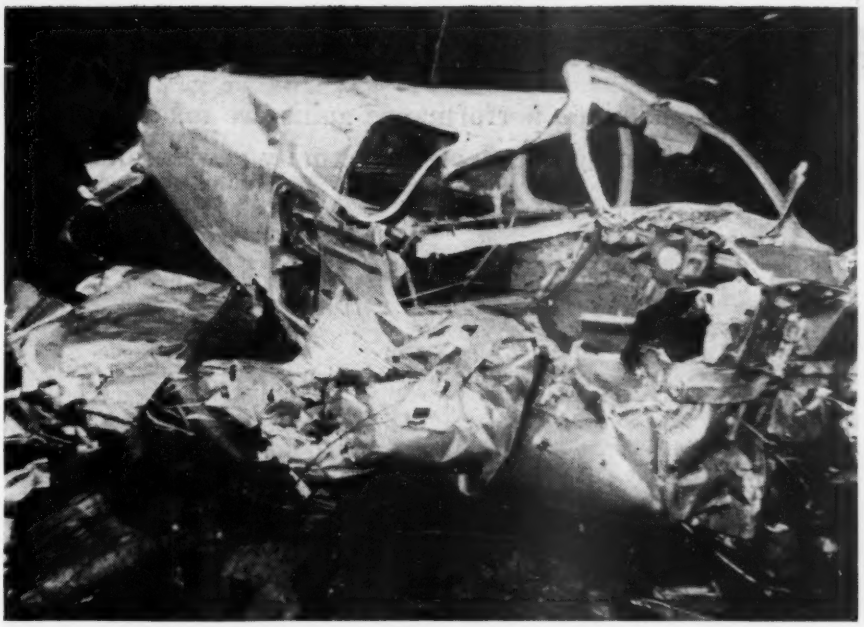
► **Impact Resistance**—CIR's investigations have revealed that a human body can absorb abrupt impact forces exceeding 100 G, and from a velocity of 50 mph. can be stopped within a distance of six inches without injury.

In a study of 15 falls from heights of 50-150 ft. to solid ground and various mechanical structures, it was found that the peak force in some of these accidents approximated 200 G, with no serious results.

On the other hand, persons are killed in 10-15 mph. accidents if the head and body are permitted to strike solid or pointed objects.

Injuries to the head, by far the most exposed and vulnerable part of the body, is the cause of 75 percent of all fatalities which occur in "survivable" light-plane accidents.

De Haven's investigations have convinced him that the degree of injury to



Because of collapsing structure, pilot got away with only cuts and bruises. Craft hit trees at 110 mph., but wings soaked up much of impact before it reached cockpit.

A baggage compartment between engine and cockpit might have saved a life. Arrow indicates position of pilot who was killed when engine pushed back on him.

the head is governed almost entirely by the kind of structure it hits not by the velocity or "severity" of the impact.

▶ **Causes**—Most head injuries result from smashing into instrument panel objects, structural tubing, and control wheels. Persons in rear seats often are killed by rigid seatbacks in front of them.

Still, the head can take terrific blows if the impact is distributed over a reasonably large area. Pilots have missed serious injury even though their heads hit instrument panels so violently that the structure was dented as much as six to eight inches. Some even have jammed their heads completely through the panel and have not been badly hurt.

In all of these cases, the person usually struck sheetmetal in an unobstructed part of the panel which "gave in" gradually and cushioned the blow.

Study of these accidents points to the conclusion that impact velocities of 50-150 ft./sec. can be stopped in a few inches without serious head injury when it strikes light, yielding structures.

▶ **Impact Investigation**—In order to determine clearly what type of panels will best absorb head blows, a separate head impact investigation has been started under Navy contract at Cornell Aeronautical Laboratory, Buffalo, N. Y.

Tests are conducted with simulated head forms, developed from medical data, consisting of 10 lb. plastic shells shaped to the approximate dimensions of a human head and filled with a gelatinous mass. (AVIATION WEEK, Sept. 13, 1948).

Forms are placed in a catapult and hurled at various types of panels at velocities ranging from 20-150 ft./sec. Tests indicate that structures which collapse gradually under impact without providing elastic rebound give the greatest degree of protection.

A type of panel which has given promising results consists of three laminations having a soft core sandwiched by a light metal on the side facing the pilot and heavier metal on the other side.

▶ **Shoulder Harness**—Obvious means for preventing head injuries would be use of shoulder harness. But many persons find it uncomfortable or think they are being excessively cautious by wearing it.

Until recently, there also was widespread belief that shoulder harness would break the neck, and that seat belts cause internal injuries. This belief was so strong that pilots have actually unbuckled their belts and harness prior to a crash.

Investigation by CIR has proved that these rumors are baseless. It was found that of hundreds of persons injured in "survivable" aircraft accidents, only 1 percent show evidence of internal injuries other than those of the head.

These findings have been impressively backed up by the Air Force and Navy. Pilots who neglect wearing harness and seat belts can be court-martialled.

Shoulder harness used by the armed forces was considerably improved during the latter part of the war with development of the inertia lock, invented by Dr. W. A. Geohegan, Cornell Medical College.

The inertia lock harness gives the pilot complete freedom of movement, but in a crash automatically locks and, in effect, freezes him in whatever position he happens to be the moment impact occurs.

▶ **Belts**—Combination in a fighter craft of a cockpit designed to hold together in 40 G crashes and a safety belt installation stressed to stand loads up to 8000 lb. is the reason so many combat pilots are able to walk away from violent crashes.

In private planes, however, 2000 lb. seat belts often fail, or the seat gives before the belt and catapults forward into wreckage with pilot still in place.

Even when the belt holds, the pilot or passenger often is injured fatally when the upper part of his body jackknifes over the belt and his head strikes a sledge-hammer blow on any object in front of him.

Other unnecessary injuries in "survivable" lightplane accidents are chest punctures caused by broken control

wheels, spinal injuries caused by collapse of seats and landing gear, and multiple leg fractures caused by failure of wooden floors used in some craft.

▶ **"Safety Wheels"**—While control wheels have been a source of injury, improved types now are saving lives in crashes by jamming occasionally in rearward position and checking forward movements of occupants.

This suggests the possibility of installing "safety wheels" in personal craft instead of shoulder harnesses.

De Haven thinks this could be accomplished by installing rugged, resilient wheels to distribute loads on the chest, and inertia locks which would check forward movement of the wheels at impact.

The combination of strong seat belts and safety wheels might prove more effective than shoulder harness.

▶ **Design Key**—CIR emphasizes that the first thing engineers must realize in order to develop better crash protection is that injuries are "mechanical results" which can be controlled by aircraft design.

CIR started in 1942 under the auspices of the National Research Council to gather data helpful to wartime operation. It now is functioning under the Cornell Committee for Air Safety Research. Funds have been supplied at various time by the Air Force, Navy, CAA, Personal Aircraft Council of the Aircraft Industries Assn., and the Aircraft Owners and Pilots Assn. The project has continually operated on a budget of less than $25,000 per year.

Titanium Given Corrosion Test

Further evidence of the potential that titanium holds for aircraft structural applications has been disclosed in test data reported by Remington Arms Co., Inc.

Experiments at Kure Beach, North Carolina, run on a comparative basis with other metals extensively used in structural applications, are stated to show that titanium is practically unaffected by exposure to sea water or marine atmosphere.

The test was conducted on commercially pure titanium produced by Remington from metal sponge made by E. I. du Pont de Nemours. Sheet and bar are obtained by melting the sponge, casting an ingot, then forging and rolling to thickness.

The sea-spray test rack was set up 80 ft. from the ocean, in the most severe atmospheric exposure at the beach, and specimens were frequently wetted by salt mist and spray. After 120 days, titanium is reported to have appeared unaffected, with comparable metals developing corrosion and rust.

Results of Afterburner Program

Such tremendous performance gains are made through tailpipe burning that device is actually new engine.

By Robert McLarren

Continued development of the turbojet afterburner[1] has produced virtually another engine in the aircraft propulsion spectrum. Rather than simply the addition of tailpipe burning to the standard turbojet, the afterburner now comprises a new type engine, often termed the "turboramjet," with its own important place in the engineer's bag-of-tricks.

The turboramjet now offers a 300-percent increase in thrust, under certain conditions, over the standard turbojet engine, a 200-percent increase in rate-of-climb for a given fighter, a 50-percent reduction in takeoff distance of the same fighter and a specific fuel consumption at high supersonic speed comparable to that of the standard turbojet engine.

The addition of afterburning has enabled the engine designer to neatly sidestep the badly bogged, high-heat material program and literally move around this problem by placing high-temperature combustion behind the turbine wheel rather than in front. Promising results obtained with tailpipe burners operating at high combustion intensities with high inlet velocities presently offer the greatest hope of attaining the intensities and temperatures desired for the high-pressure turbine engine cycle.[2]

▶ **Excess Air**—Present turbine materials limit the turbine inlet temperature of current turbojets to about 2000 R. (Degrees Rankine equals degrees Fahrenheit plus 460.) Fig. 1 illustrates the almost direct relationship between the temperature rise through the combustor and the percentage of oxygen consumed.[3]

It will be noted that 2000 R (1540 F.) at the turbine is made up of ambient temperature plus compressor temperature rise plus the combustor temperature rise which, in a typical case, gives the latter a value of about 1660 R (1200 F.).

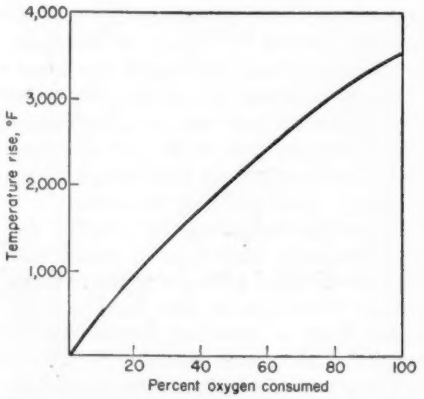


Fig. 1: Variation of temperature rise with oxygen consumption. Data from Ref. 3.

Referring to Fig. 1, this temperature rise is obtained when only 25 percent of the residual oxygen is consumed.

To restrict temperature rise through the combustor to this figure, it is necessary to dilute and quench the flame within the unit by bypassing 75 percent of the oxygen. Thus, it is obvious that the turbojet is required to handle 300 percent excess air to hold turbine inlet temperature to a value safely handled by presently available materials.

Since the propulsive efficiency of a turbojet varies directly as its thrust per unit mass air flow,[4] it is obvious that this large excess of air, used only for cooling purposes, severely penalizes maximum potentialities of a given design. By utilizing an increased percentage of this air for combustion, hence thrust, propulsive efficiency of the engine can be increased proportionately.

▶ **Thrust Factors**—The turbojet engine produces approximately constant thrust at a given altitude and engine speed regardless of airplane speed. While this is an important advantage at high speed, it limits sharply the acceleration of a jet aircraft on takeoff.[5]

In a typical current design, takeoff thrust is only 15 percent greater than normal rated thrust. This is in distinct contrast to the propeller-driven engine, a combination which produces a thrust two or three times that required for steady level flight.

Thus, to give the jet craft the same takeoff characteristics as an equivalent propeller-driven plane requires about double its normally available thrust.

▶ **Tailpipe Advantage**—By the addition of tailpipe burning, both of these conditions are accommodated; that is, excess oxygen in the air is utilized for additional combustion which, in turn, provides the increased thrust required for takeoff, high rate-of-climb and rapid acceleration at high speed. Further, at supersonic speeds in which ram compression alone provides the pressure rise required, the afterburner functions as a virtual ramjet, with its high thrust and efficiency.

When required, the afterburner may be shut down and the engine become a normal turbojet, thus making of the turboramjet an extremely flexible and efficient powerplant.

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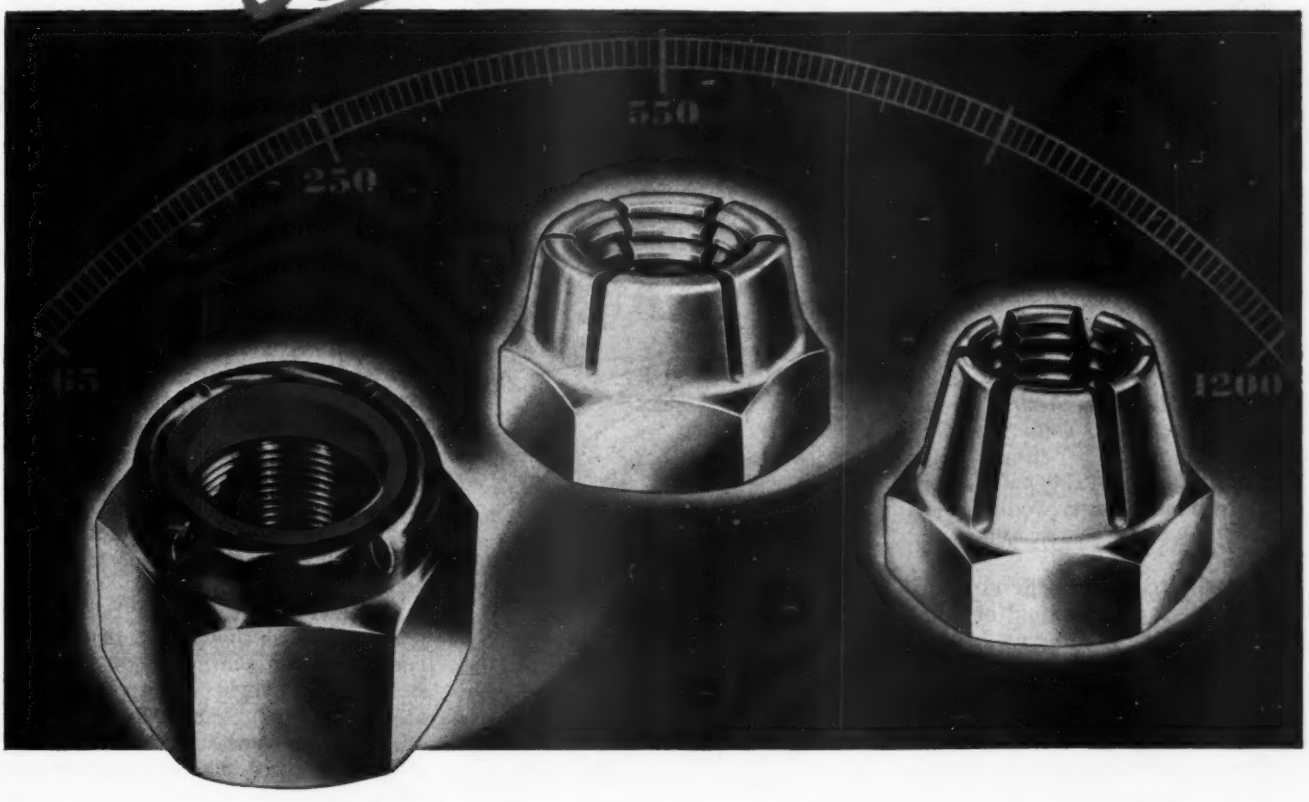

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With the addition of the new Z-550 and Z-1200 series, ESNA now has a specific nut design for all temperatures ranging from minus 65° F. to plus 1200° F. Self-locking, in both fully seated and positioned settings, these fasteners provide permanent protection against *vibration, impact* and *stress reversal.*

The two new nut designs represent the most efficient solution found by ESNA engineers after detailed research and production line studies of fastening problems encountered under elevated temperatures. Both fully meet ESNA standards for controlled quality and full interchangeability on class 3 bolts with minimum torque scatter. This controlled torque which is a feature of all ESNA nuts assures uniform bolt loading and permits more compact design, with resulting weight reduction. It also simplifies maintenance problems and speeds up field replacements.

Specifically, for applications between —65° F. and +250° F., the nut with the famous red fiber collar offers unequalled protection against vibration, thread corrosion and liquid seepage. The ZM and ZE nuts are designed for sustained temperatures up to 550° and the Z-1200 series has been engineered to withstand multiple cycles of exposure to extreme temperatures up to 1200° F. without seizure. Like all Elastic Stop Nuts, these fasteners are readily removed—do not damage threads or gall the finish—and they can be reused.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Or, if you want further information, write for literature. Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.

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► **Makeup**—The afterburner consists essentially of a diffuser section behind the turbojet turbine, a circumferential ring of fuel nozzles, a flame holder assembly and a variable-area nozzle. Also, it requires fuel lines from the fuel supply to the fuel nozzles, a tailpipe fuel flow control, tailpipe temperature indicator, an ignition assembly, additional insulation or cooling means for the tailpipe and control mechanism for the variable-area nozzle.

Actually, this equipment adds only about 20 percent to the weight of the basic turbojet engine[5] but its large increase in thrust results in a thrust per unit weight of about twice that of the basic engine at static sea level conditions[5] and, of course, an even greater ratio of high flight speeds.[6]

► **Diffuser Efficiency**—Since the turbine outlet velocity, in a typical case, may be 750 fps. and stable burning in the afterburner cannot be maintained above about 400 fps., it is apparent that the velocity must be reduced through the use of a diffuser, an expanding duct aft of the turbine. If this diffuser could have an efficiency of 100 percent, the thrust of the afterburner would remain constant, but unfortunately this is not the case.

Fig. 2 illustrates the effect of diffuser efficiency on the amount of thrust obtained from the afterburner for various values of turbine discharge velocity.[7] For example, under static thrust conditions at sea level, with a diffuser efficiency of 80 percent, the afterburner thrust increase is reduced from 48 percent at 800 fps. to 43 percent at 1200 fps.

It is the efficiency of this diffuser that comprises a critical design feature in the operation of the airplane with the afterburner inoperative, such as during normal cruise conditions.

The lower set of curves illustrates the loss in thrust of the turbojet engine alone for various diffuser efficiencies and turbine discharge velocities. This shows a loss of 5 percent of the engine thrust due to the presence of the afterburner, when it is not in use. The serious loss of thrust, with the afterburner inoperative, in a diffuser with an efficiency of 60 percent is clearly shown.

► **Burner Drag**—Another important loss in thrust with the afterburner is seen in Fig. 3, which shows the effect of burner drag on the thrust at various values of burner inlet velocity. This graph discloses that with a high burner drag and inlet velocity the afterburner will produce little if any thrust augmentation. It also shows the substantial loss in thrust in the turbojet engine with afterburner inoperative when burner drag is excessive.

However, some drag is necessary within the afterburner to slow down the flow, create turbulence and hence facilitate burning. Therefore, it may be more advisable to use a low burner inlet velocity with a fairly high drag burner assembly because of the high thrust augmentation attained.

► **Inlet Velocity Factor**—Since the principal purpose of the afterburner is to provide high jet velocities through increased jet temperature, the relationship between burner exit gas temperature and augmented thrust is the basic criterion of the unit. This relationship is shown in Fig. 4 for a series of burner inlet velocities.

This graph again shows the importance of low burner inlet velocities, with the desired burner exit temperature of 4000 R. being obtained only with an inlet velocity or 200 fps. Higher inlet velocities merely reduce the thrust available from a given burner exit gas temperature or increase the temperature required to produce a given thrust increment. Ultimately a combination of inlet velocity and temperature is reached at which the pipe chokes and no further increases can be made.

Fig. 5 presents these data in a slightly different form by plotting thrust increase vs. tailpipe velocity for various percentages of oxygen consumed. Again, the thermal choking condition is shown to limit the velocities and thrusts practically obtainable. Once choking occurs, further increases in temperature or velocity simply create added backpressure on the turbine, hence actually causes losses in thrust output.

► **Turbojet vs. Turboramjet**—Fig. 6 summarizes the important difference in performance between turbojet and turboramjet engines. The lower portion of the chart shows the familiar variation of turbojet thrust with airplane speed and its virtually constant output regardless of flight velocity. It will be noted that the output at 35,000 ft. is only about 40 percent that at sea level.

Consider now the upper portion of the graph which shows, first, that turboramjet thrust continues to increase steadily with flight speed, ultimately reaching a 300 percent improvement over the output of the turbojet engine at a speed twice that of sound at sea level. This steady increase is also shown for the 35,000-ft. case, although its slope is substantially less than the sea level case.

However, major interest attaches to the low speed end of the parameter which indicates that thrust of the turboramjet is virtually independent of altitude up to the speed of sound. It is this characteristic that renders tailpipe afterburning ideal for in-flight thrust augmentation. This effect is shown more clearly in Fig. 7, which illustrates the substantially constant thrust of the turboramjet from sea level to 50,000 ft. altitude at Mach number 0.85 at a value of 100 percent increase over the normal thrust of the turbojet.[8]

► **Fuel Problem**—But these remarkable gains are not obtained without a sacrifice in some other condition, in this case, specific fuel consumption.

Fig. 8 summarizes the penalty that must be paid in extra fuel if these high outputs are to be obtained and tend to indicate in general that the specific fuel consumption of the turboramjet is approximately double that of the turbojet engine up to the speed of sound but at supersonic speed the two consumptions tend to approach each other.

In any case, the specific fuel con-

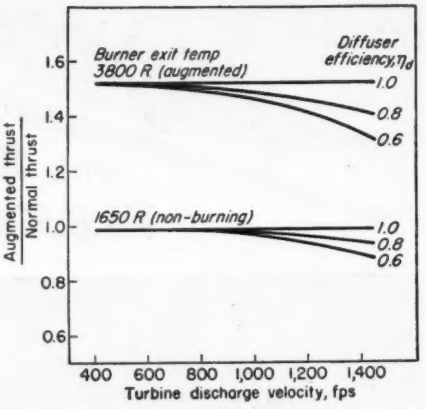

Fig. 2: Effect of diffuser efficiency on static thrust at sea level for various turbine discharge velocities. Data from Ref. 7.

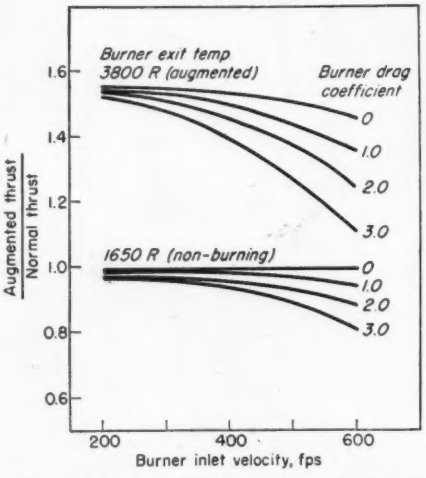

Fig. 3: Effect of burner drag on the thrust at various burner inlet velocities. Data from Ref. 7.

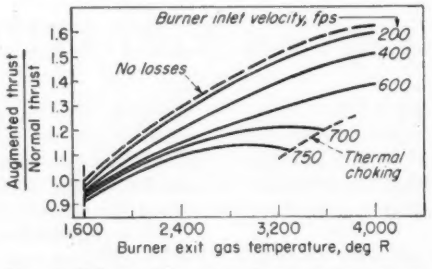

Fig. 4: Effect of burner exit gas temperature on thrust at various burner inlet velocities. Data from Ref. 7.

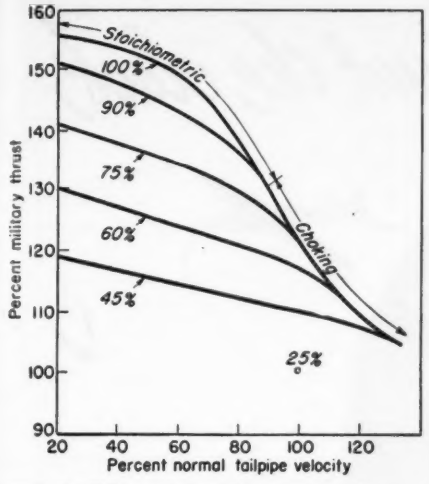

Fig. 5: Effect of oxygen consumption on thrust at various tailpipe velocities. Data from Ref. 3.

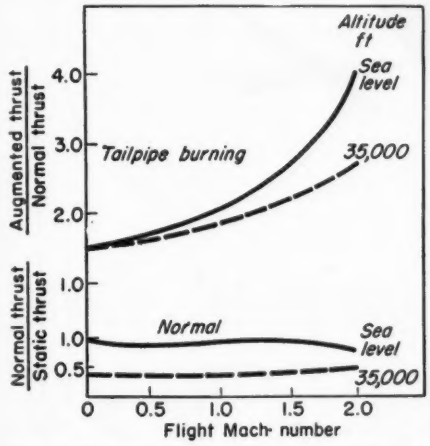

Fig. 6: Effect of flight conditions on thrust. Data from Ref. 7.

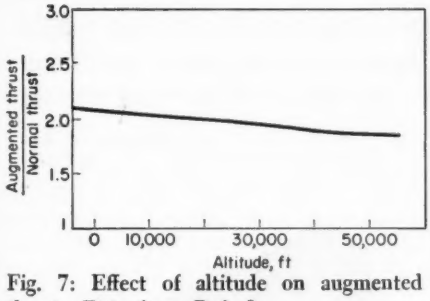

Fig. 7: Effect of altitude on augmented thrust. Data from Ref. 8.

sumption of the turboramjet is lower than that of the ramjet at supersonic speed and has the additional advantage of providing takeoff power, which the latter does not.

▶ **Specific Study**—It is of interest to examine the effect of tailpipe afterburning on the performance of a turbojet-powered fighter. Fig. 9 gives results of a study by Lockheed Aircraft Corp.[5]

Left side of the chart indicates the remarkable gains afforded in rate-of-climb, with a 200 percent improvement at sea level still being 75 percent at 35,000 ft.

Right side indicates that whereas improvement in maximum speed at sea

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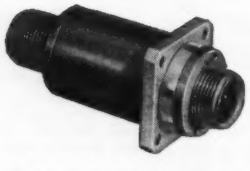

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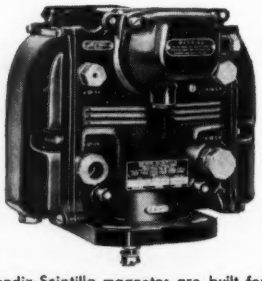

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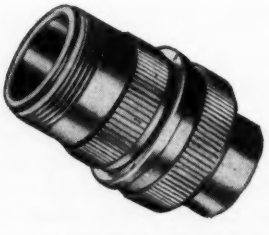

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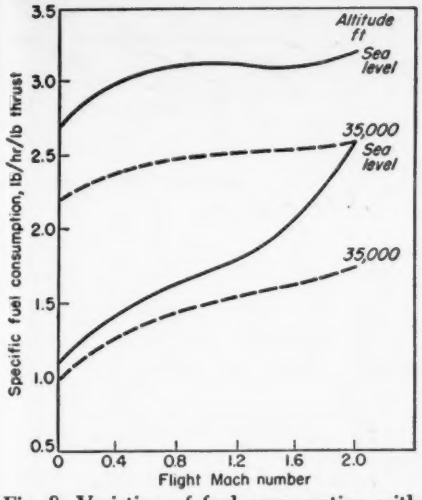


Fig. 8: Variation of fuel consumption with speed and altitude. Data from Ref. 7.

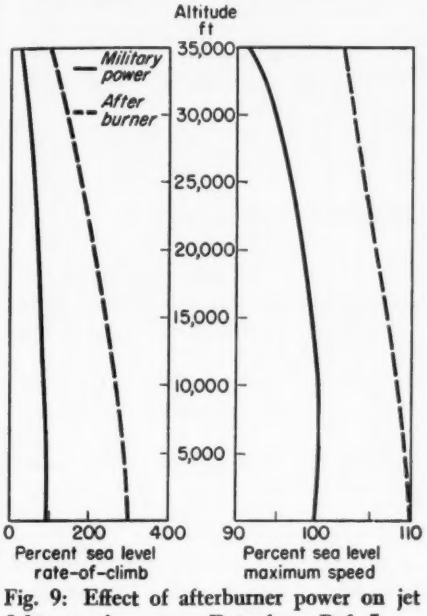


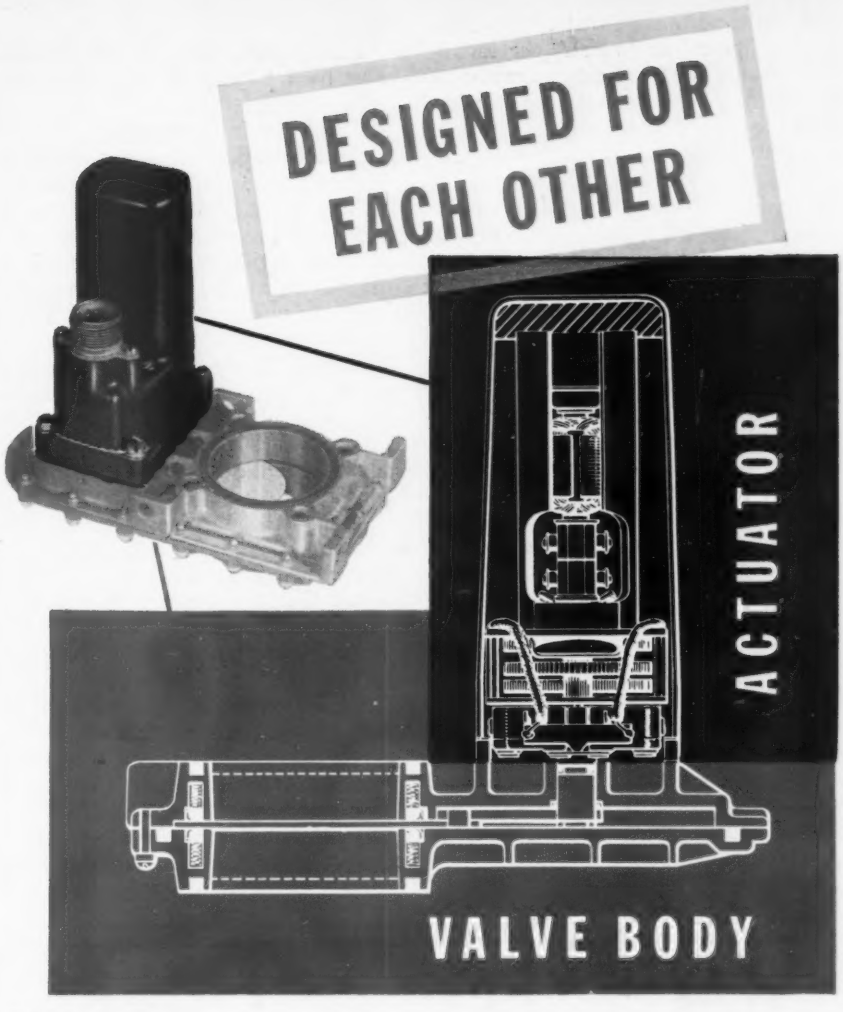
Fig. 9: Effect of afterburner power on jet fighter performance. Data from Ref. 5.

level is small this is increased with increase in altitude. It should also be noted that this improvement in maximum speed is made at a speed above the critical Mach number of the design, so that this is a substantial gain in this speed range.

But probably the most important benefit shown by the study is the reduction in takeoff run of this design from 4520 ft. with turbojet rated power to only 2255 ft. with afterburner power, a reduction of better than 50 percent.

▶ **Control Considerations**—Addition of the tailpipe afterburner to the turbojet engine introduces problems of control that have not yet been solved satisfactorily.[9] Since tailpipe burning is designed to increase the thrust of the basic turbojet engine operating at maximum engine speed and temperature, controls must be provided to maintain these latter conditions when the afterburner is operating.

However, both engine speed and



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temperature are affected by changes in tailpipe conditions, so that engine fuel flow, tailpipe fuel flow and the variable area nozzle must be closely controlled if maximum power is to be obtained from the basic engine, and, therefore, the combination.

The basic engine is affected only by the engine fuel flow, which can be easily controlled through various compensating devices. Tailpipe burner is affected only by the airflow from the turbine and by the turbine outlet temperature, as previously described, and by the tailpipe burner fuel flow. These factors, too, can be controlled fairly easily. However, the exhaust nozzle area affects the performance of the tailpipe burner, which, in turn, produces a back pressure on the turbine. This back pressure effects the turbine power and outlet temperature, the engine speed, airflow and turbine inlet temperature. This chain of events takes time and it is the knowledge of the times required that are important in matching a control to an engine.

▶ **Time for Variables**—Fig. 10 illustrates time required for three of these variables to complete the transition from one steady state to another, assuming a fixed exhaust nozzle area. Note that fuel flow is adjusted most quickly, that turbine outlet temperature stabilizes next most quickly and that engine speed reaches a new steady state the slowest of all.

Fig. 11 illustrates the affect on turbine back pressure of variations in the exhaust nozzle area for different rates of fuel flow. In this graph, 100 percent turbine back pressure is the steady-state back pressure for these engine conditions and, therefore, the pressure that the control system must maintain for constant engine speed operation. Slopes of the curves indicate how responsive back pressure is to changes in exhaust nozzle area or tailpipe fuel flow.

▶ **Changes Produced**—The slopes of the curves are quite consistent, particularly near the steady-state operating condition and as a first approximation for control purposes may be considered constant.

Response of turbine back pressure to changes in exhaust nozzle area can be determined from these curves. Fig. 11 shows that a 5 percent change in exhaust nozzle area will produce about 10 percent change in turbine back pressure.

Similar plots indicate that 10 percent change in turbine back pressure produces an initial engine acceleration of about 350 rpm. per sec.; engine fuel flow produces the principal effect on turbine outlet temperature at constant engine speed; a momentary decrease in engine speed results in an increase in turbine outlet temperature; a 10 percent change in engine fuel flow will produce about a 3 percent change in turbine back pressure.

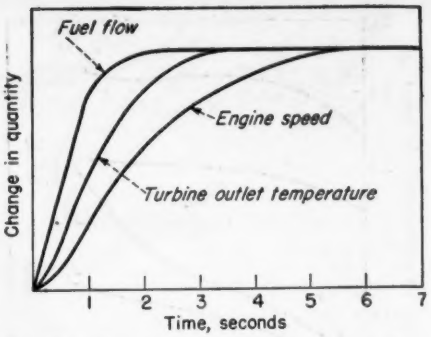

Fig. 10: Transition time for several engine variables. Data from Ref. 9.

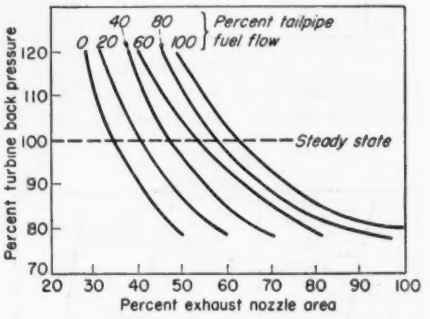

Fig. 11: Effect of exhaust nozzle area on turbine back pressure. Data from Ref. 9.

By thus plotting all of the pertinent engine variables and their accompanying effects on other characteristics, a complete dynamic picture of the engine can be drawn.

▶ **Analog Developed**—Based on the similarity of electrical to mechanical systems an electric analog has been developed from which it is possible to duplicate the transient characteristics of an engine and control. This analog can be adjusted so that the above transient characteristics are duplicated in terms of electrical units. The control simulating elements of the analog are then superimposed upon the engine characteristics and the characteristics of the resulting system can be observed.

The control elements can be adjusted rapidly until the desired stability and response rates are obtained. However, accuracy of the results obtained from this method are entirely dependent upon accuracy of the engine transient data and no effort should be spared in obtaining reliable, accurate data upon which to design a control system.

The turboramjet engine offers a vital new powerplant that not only can provide the power to bring high-speed aircraft from takeoff into the transonic zone but can "bridge" across this regime well into supersonic speed with efficiency and dependability.

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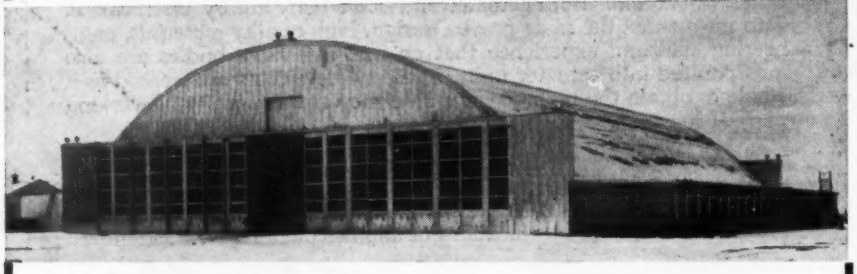

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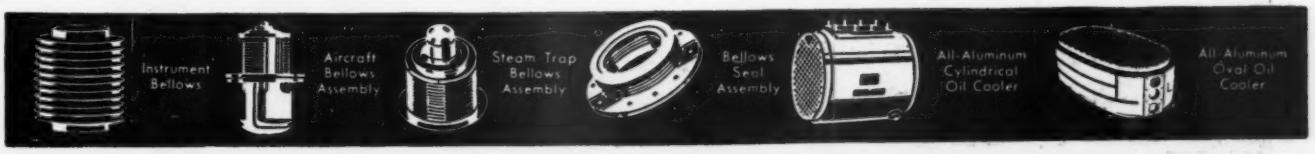
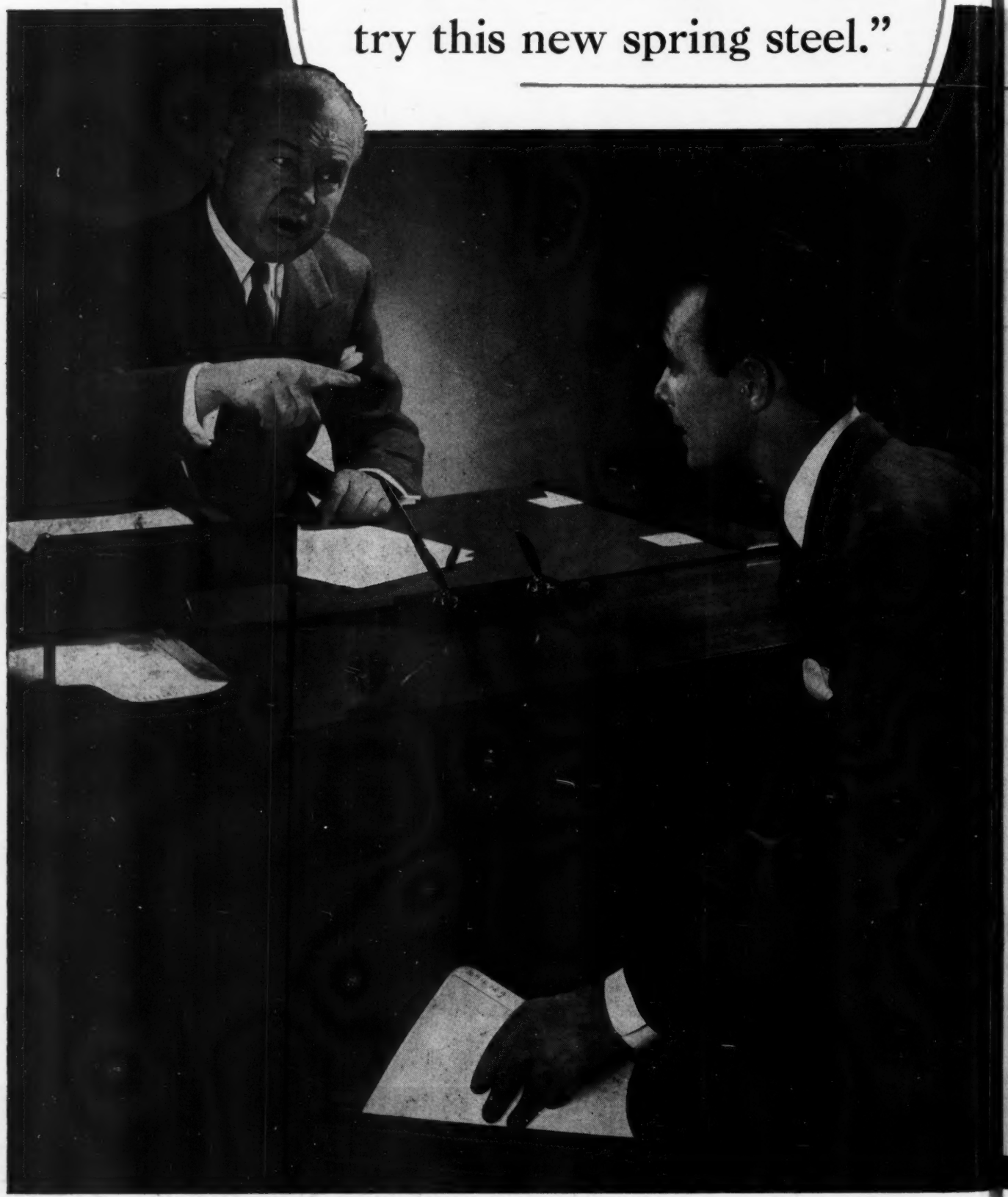


"All right," *he said,* "give me one good reason why I should try this new spring steel."



so we gave him three!

"First," we told him, "this steel we've developed is lower in cost—in fact will cost you about $7.00 a ton less. Second, it has a better, smoother surface than the steel you're now using, which means that you'll lessen the danger of failure. And, third, with this steel there is less decarburization during heating and you'll get better strength in your springs."

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To these savings have been added others equally important. Re-treatment to meet load rates has been reduced from 40% to as low as 2%. Rejects dropped 50%, the inspection crew has been reduced by half.

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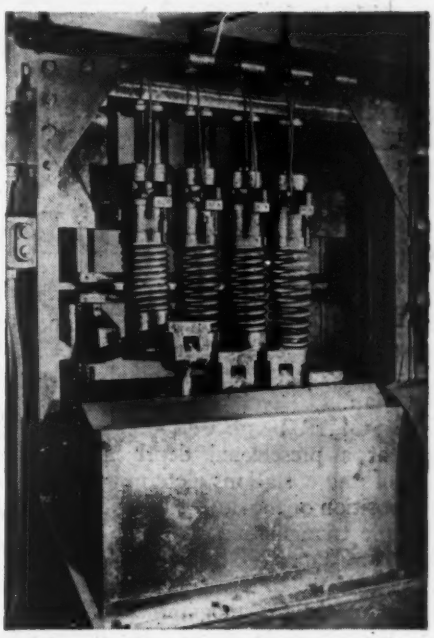

FATIGUE TEST—Here passenger car coil springs, produced from SAE-AISI 5160, a new precision-rolled spring steel, are being run 500 hours, sufficiently overloaded to stimulate life test on passenger car. No failure yet recorded.

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pioneered the development of the turbojet afterburner in collaboration with Solar Aircraft Co., and not only has modified the Chance Vought F6U Pirate for afterburner installation but has designed the Chance Vought F7U Cutlass initially for afterburner power.

Lockheed Aircraft has carried out afterburner development work and flight tests under Air Force contract, and the NACA Lewis Flight Propulsion Laboratory is conducting a broad theoretical and experimental research program designed to bring this new engine into a thoroughly-understood form.

Failing the unanticipated development of some vastly superior heat-resistant turbine material, the turbojet afterburner is certain to provide gas turbine propulsion engineers with their most important new avenue of progress since the advent of the gas turbine aircraft engine itself.

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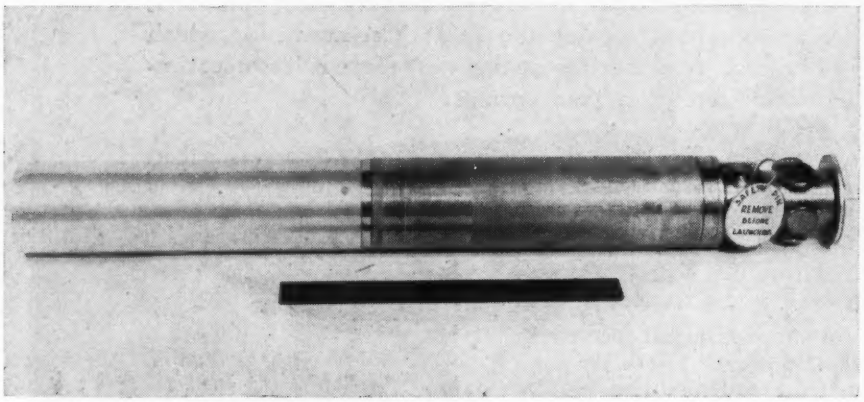


Air-Sea Rescue Bomb

Navy Department has developed SOFAR—sound fixing and ranging—into an important new tool for air-sea rescue and has placed a new-type bomb into production.

The SOFAR bomb explodes underwater at a preselected depth and a series of shore stations determine the exact position of the downed flight crew by simple triangulation.

▶ **Sound Channel**—Discovery of SOFAR is credited to Dr. Maurice Ewing, scientist of the Oceanographic Institution, Woods Hole, Mass. He determined that the speed of sound is at a minimum through a range of 1500 to 4000 ft. below the ocean's surface. Exact depth of this channel varies with temperature and pressure gradients in a local area but any sounds created in this channel will be transmitted for several thousand miles.

Dr. Ewing also learned that sounds originating outside the channel do not interfere with transmission of sounds emanating from within the channel.

▶ **Background**—The Navy Bureau of Ships and the Oceanographic Institution hurried development of SOFAR during the war. BuShips determined that the idea was sound but that the small bomb being used was too complicated for use by inexperienced personnel. BuShips then asked Bureau of Ordnance to develop a new bomb that was simple enough for handling by untrained personnel.

BuOrd placed a development contract with the Frederick Hart Co., Poughkeepsie, N. Y. and the resulting bomb was a modified Mk 15 practice depth charge equipped with pressure-operated fusing.

▶ **How Bomb Operates**—The new bomb carries a "bottle cap" top, removed with an accompanying bottle opener. The bomb carries a small chart from which the correct depth of the sound channel at the location of the castaway is determined.

A corresponding setting is chosen from the six settings stamped on the bomb, and the cap beneath this reading is removed. The bomb is then dropped over the side.

When the preset depth is reached, the pressure in the open cap ruptures a diaphragm which drives a firing pin into the detonating charge. Within minutes, the signal is recorded on paper tape at three monitoring stations and plotters make a "fix" determining the location of the blast.

▶ **For Life Raft Kits**—The Navy completed tests of the bomb in the Pacific Ocean in July, 1947 and reported that bombs dropped in the vicinity of the Hawaiian Islands had been heard and recorded 2300 mi. away at Point Sur, near Monterey, Calif.

The Thomas A. Edison Co., West Orange, N. J., has been awarded a contract to build 5000 of the bombs.

Student Study Plan Set by Cornell Lab

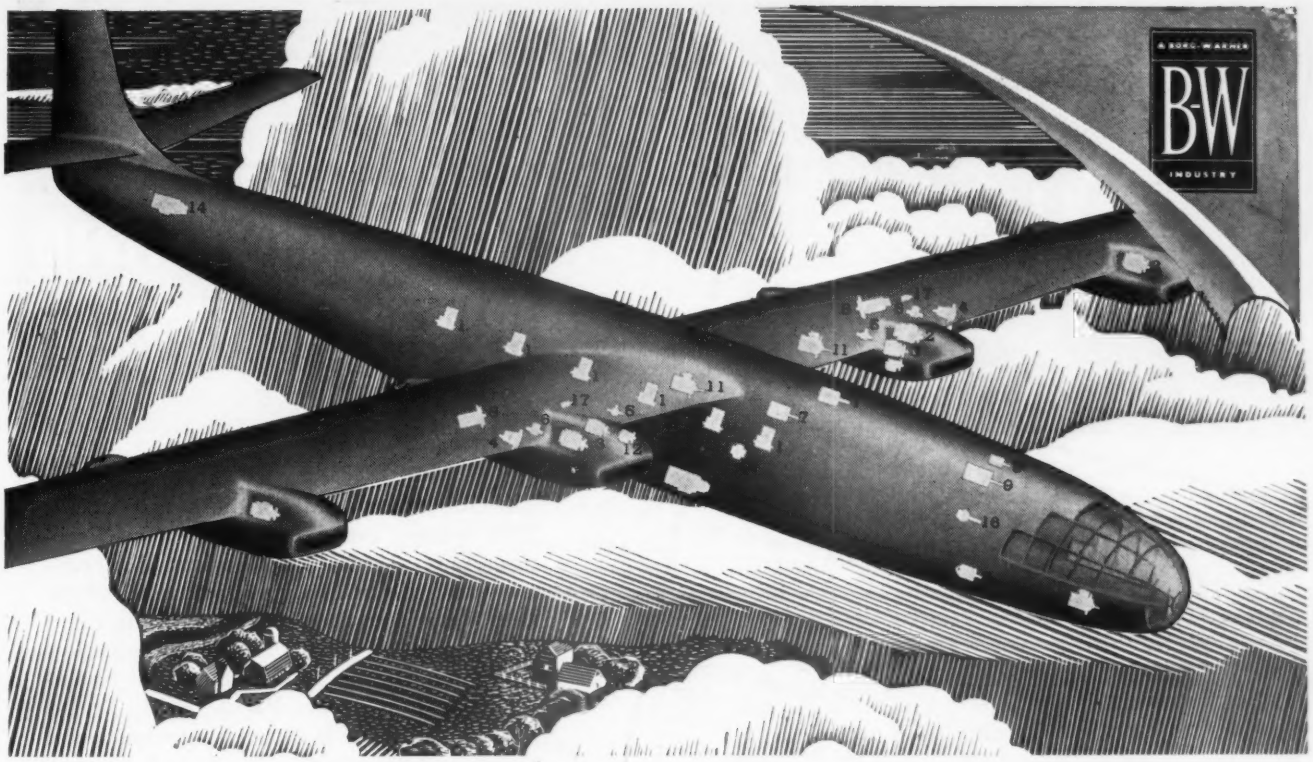
Cornell Aeronautical Laboratory Research Associates has been established to provide a continuing participation by airframe and engine manufacturers in the research program of the laboratory. By donating $50,000 to the laboratory, a manufacturer establishes a fellowship in exploratory research for a graduate student at the University.

The fellowship will pay the student $1200 annually plus tuition fees, and he will conduct research in the laboratory on a subject to be mutually agreed upon.

The manufacturer has the option, however, of directing the laboratory to support exploratory research in the name of the company in a general field to be agreed upon by the laboratory and the firm. For example, the money may be used for research in the specific fields of supersonics, combustion, high-temperature alloys, computers, etc. depending on the range of his current interests.

The laboratory has named the six original companies which contributed $675,000 to Cornell for establishment of the facilities as permanent participants in the program. In addition, Republic, Fairchild, Grumman, Curtiss-Wright, Bell, United Aircraft and Avco Manufacturing Co. have assumed associate membership in the new Cornell program.

Dr. T. P. Wright, president of the laboratory, sums up the new plan: "The project will enable the laboratory to implement a two-fold program of developing new knowledge through research and of training engineers and scientists for significant roles in industry."



In Jets, too*, there are 36 places where Pesco PRECISION Equipment gives Positive Performance

Positive performance has always been a "must" for aircraft equipment. It's a major reason why Pesco precision fuel and hydraulic products have long been standard equipment on reciprocating engine planes.

Today, the jet plane, with its higher speeds and consequently greatly increased fuel pressure and capacity requirements, has placed even more emphasis on positive performance.

To meet these new conditions, Pesco has developed for jet planes such vital equipment as the high-pressure fuel pump . . . the pump that is really two pumps in one so that if the main pump fails, another pump automatically goes into operation to keep fuel flowing continuously. So important was this development, that America's leading builders of jet engines have standardized exclusively on this Pesco high-pressure fuel pump.

Altogether, there are 17 Pesco products that can be used in 36 places, on jet planes. They are listed at the right.

Working hand in hand with the aircraft manufacturer's own engineers, Pesco has kept constant pace with aviation's rapid advances. It is experience and "know-how" that can be of real help to you. Take advantage of it.

*On reciprocating engine planes there are also 36 places where Pesco precision equipment is used.

KEY TO PESCO EQUIPMENT

1. Fuel Booster Pumps (6)
2. High-pressure Fuel Pumps—Engine-driven (4)
3. Vacuum Pumps (2)
4. Oil Separators (2)
5. Suction Relief Valves (2)
6. Pressure Relief Valves (2)
7. Electric Motors for Cabin Ventilators (2)
8. Landing Gear Operation:
   a. Engine-driven Hydraulic Pump System
   b. Electric Motor-driven Hydraulic Packages
   c. Electric Motor Actuators
9. Electric Motors for Cabin Heaters (2)
10. Motors for Blowers to Remove Wing Gases (2)
11. Windshield Defroster Blower Motor (1)
12. Engine-driven Hydraulic Pumps (2)
13. Motor-driven Emergency Hydraulic Pump (1)
14. Motor-driven Surface Booster Pump (1)
15. Hydraulic Flow Equalizer (1)
16. Hydraulic Pressure Reducing Valve (1)
17. Hydraulic Pressure Relief Valves (2)

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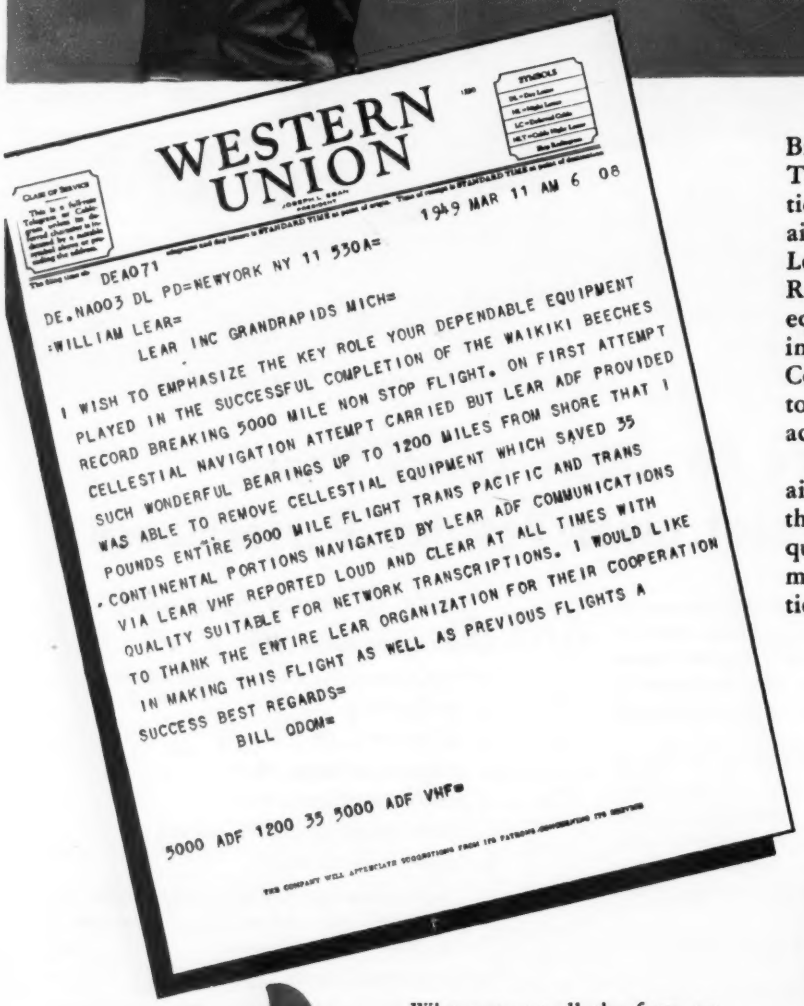
BORG-WARNER CORPORATION
11610 Euclid Ave. · Cleveland 6, Ohio
MANUFACTURERS OF BW SUPERCHARGERS

BILL ODOM ACCLAIMS Brilliant Navigational Performance of *Lear* V H F EQUIPMENT AND AUTOMATIC DIRECTION FINDER



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I WISH TO EMPHASIZE THE KEY ROLE YOUR DEPENDABLE EQUIPMENT PLAYED IN THE SUCCESSFUL COMPLETION OF THE WAIKIKI BEECHES RECORD BREAKING 5000 MILE NON STOP FLIGHT. ON FIRST ATTEMPT CELLESTIAL NAVIGATION ATTEMPT CARRIED BUT LEAR ADF PROVIDED SUCH WONDERFUL BEARINGS UP TO 1200 MILES FROM SHORE THAT I WAS ABLE TO REMOVE CELLESTIAL EQUIPMENT WHICH SAVED 35 POUNDS ENTIRE 5000 MILE FLIGHT TRANS PACIFIC AND TRANS CONTINENTAL PORTIONS NAVIGATED BY LEAR ADF COMMUNICATIONS VIA LEAR VHF REPORTED LOUD AND CLEAR AT ALL TIMES WITH QUALITY SUITABLE FOR NETWORK TRANSCRIPTIONS. I WOULD LIKE TO THANK THE ENTIRE LEAR ORGANIZATION FOR THEIR COOPERATION IN MAKING THIS FLIGHT AS WELL AS PREVIOUS FLIGHTS A SUCCESS BEST REGARDS=

BILL ODOM=

5000 ADF 1200 35 5000 ADF VHF=

Bill Odom's selection of the Lear ORIENTER*—Low Frequency Automatic Direction Finder—as his main navigational radio aid—and the brilliant performance of the Lear Very High Frequency Transmitter and Receiver for his radio and communication equipment on his 5000 mile record breaking non-stop Trans-Pacific and Trans-Continental flight is a clinching testimonial to its range, weight saving advantages, accuracy and dependability.

This endorsement should convince every aircraft user of the necessity of investing in the Lear Orienter and the Very High Frequency Lear Omnimatic* System as the most essential installation for all navigation and communication needs.

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LEAR ORIENTER OR LEAR OMNIMATIC
ONLY 24-POUNDS EACH

Why not get all the facts on these world famous Lear Aircraft Radio products? They are popularly priced for the average plane owner's pocket book—Consult your dealer—or write us direct.

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The Name Men Fly By

AIRCRAFT RADIOS • ELECTRICAL AND MECHANICAL EQUIPMENT • AUTO-PILOTS • AIRCRAFT PUMPS • WIRE RECORDERS

Totals of ECA Orders Received by U. S. Companies For Aviation Equipment (Through Dec. 31, 1948)

Supplier	Purchaser	Value
Adel Precision Products Corp. Burbank, Calif.	Air France, France	$1,475.14
Aero Bolt & Screw Co. West New York, N. J.	Air France, France	5,400.63
Aeronautical Instrument & Radio Co. Little Ferry, N. J.	Air France, France	30,602.66
Aircraft Engines & Parts Co. New York, N. Y.	French Supply Council, France	8,517.00
Air Union Inc. Washington, D. C.	Air France Direction Technique Paris, France	15,750.00
Aircraft Export Corp. Hartford, Conn.	Air France, France	1,919.04
Bendix International New York, N. Y.	Air France, France	6,459.84
B. G. Corp. New York, N. Y.	Air France, France	57,200.00
Curtiss-Wright Corp. New York, N. Y.	Air France, France	194,312.63
	French Supply Council, France	4,525.36
Douglas Aircraft Co. Santa Monica, Calif.	Air France, France	18,923.31
Santa Monica, Calif.	Det Danske Luftfartselsrab A/S, Denmark	821,790.69
Santa Monica, Calif.	Norwegian Airlines, Stockholm, Sweden	822,477.02
Empire State Bearing Co. New York, N. Y.	Air France, France	1,010.00
Gladkoff, David New York, N. Y.	Air France, France	600.00
B. F. Goodrich Co. Akron, Ohio	Air France, France	6,276.90
Goodyear Tire & Rubber Co. Akron, Ohio	Air France, France	6,473.00
Lockheed Aircraft Corp. Burbank, Calif.	Air France, S. A., Paris, France	2,670.09
International B. F. Goodrich Co. Akron, Ohio	Air France, S. A., Paris, France	20,255.33
Luckey, L. H., Co. Dallas, Tex.	French Supply Council, France	39,558.13
Marquette Metal Products Co. Cleveland, Ohio	Air France, Paris, France	1,731.51
Sperry Gyroscope Co. Great Neck, N. Y.	Air France, France	22,247.11
United Aircraft Export Corp. E. Hartford, Conn.	Air France, France	317,373.18
	Total	$2,407,548.57

ECA Strengthens Export Business

More than $42-million authorized to purchase planes and parts, with Netherlands largest beneficiary.

ECA rounded out its first year with $42.8-million authorized for aircraft, parts, accessories, and ground handling equipment. With the exception of about half a million dollars, all of this money was for purchases in the U. S. In Western Europe, the bulk of the planes and equipment went towards building up and maintaining the various international airlines, many of which compete with U. S. carriers.

Aside from spare parts and miscellaneous accessories, there were included in the first years aviation procurement authorizations, nine Constellations (one of which was used), 10 new DC-6s, five used DC-4s, and eight Convairs. All the second-hand planes were bought from American Airlines. Actually, ECA didn't necessarily pay for all of these aircraft in full, but where it didn't it footed most of the bill.

▶ **KLM Harvest**—Netherlands (KLM) reaped the biggest harvest in ECA aviation dollars—rounded out the first year with $19.1-million, which, aside from parts, etc., went for two Constellations (new), six DC-6s, and two Convairs. France (mostly Air France) was next with $14.4-million for parts, six new Constellations, five used DC-4s, and one used Constellation.

Italy has received $5-million, but, so far, has spent only $126,000 of it, and that for two Bell helicopters to be used for pest control. Some small amount has also been expended for the maintenance of Italian DC-3s operating over routes between Italy, Belgium, Czechoslovakia, and the Near East.

▶ **Belgium Purchases**—Through the middle of April, Belgium had received $1.6-million which went far towards the purchase of six Convairs. In addition, Norway has gotten $1.1-million for two DC-6s for S.A.S. (Scandanavian Airlines System). Partial payment for two more S.A.S. DC-6s has been made to Denmark in the amount of $800,000. Meanwhile, Ireland and Greece have each received $400,000 in ECA money, mostly for spare parts and possibly small aircraft which are not specified on ECA books as such, as are large transport-type planes.

Of this $42.8-million total in procurement authorizations so far, only $2,407,548.57 in purchases from U. S. suppliers of aircraft, parts, accessories, and ground handling equipment have been reported. Reason is that ECA doesn't tote these up until after the entire transaction has been completed and all necessary documents received in Washington and checked both ECA and GAO (General Accounting Office).

PRODUCTION BRIEFING

Hindustani Aircraft factory at Bangalore is making 50 Percival Prentice trainers and designing three new types of light planes for use of the Royal Indian Air Force and private flyers.

Northrop Aircraft, Inc., appointed Rudolph Fink as its Dayton representative. He formerly was manager of the aircraft division of Aro Equipment Corp., Bryan, Ohio, and prior to his resignation from the Air Force in 1947 was a colonel with Wright Field and overseas duty.

Doman Helicopter Corp. of Danbury, Conn., plans to manufacture its LZ-2A helicopter with a selling price of approximately $20,000. The helicopter is designed for industrial and agricultural uses and will carry a 1400 lb. useful load.

Latest Bid Awards to Industry by U. S. Air Force

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX72.

Abstracts of Bid Awards

For 69,800 fitting assemblies (49-1562):
Companies sharing—Tinnerman Products, Inc., Cleveland, O. on a bid of $2647; Weatherhead Co., Cleveland, O., on a bid of $1422, and Trine Manufacturing Co., Richmond, Ind., on a bid of $807.50.

For 150,000 lb. blasting grit (49-1522):
Harwick-Standard Chemical Co., Akron, O., on a bid of $3675.

For fitting assemblies (49-1504):
Companies sharing—Aeroquip Corp., Jackson, Mich., on a bid of $27,434.84; Deutsch Co., Los Angeles, on a bid of $4372; Rosan Inc., South Gate, Calif., on a bid of $35, and Weatherhead Co., Cleveland, O., on a bid of $1146.

For 5000 aircraft batteries (49-1387):
National Battery Co., Depew, N. Y., on a bid of $242,450.

For grommets, nuts, plugs, etc., (49-1268):
Companies sharing—Deusch Co., Los Angeles, on a bid of $761.30; Air Associates, Inc., Teterboro, N. J., on a bid of $3299.90; Aircraft Fitting Company, Cleveland, O., on a bid of $102.50; Weatherhead Co., Cleveland, O., on a bid of $1343; Ohlson International Corp., Long Island, N. Y., on a bid of $1115.04; Monadock Mills, San Leandro, Calif., on a bid of $716, and Pacific Piston Ring Co., Los Angeles, on a bid of $185.

For 76 camouflage principles (49-1242):
Color Service Co., New York, on a bid of $5424.47.

For bolts, crosses & elbows (49-1234).
Companies sharing—Ohlson International Corp., New York, on a bid of $1307.70; Deutsch Co., Los Angeles, on a bid of $3783.24; Allied Screw Machine Co., Inc. Chicago, on a bid of $242.75; Aircraft Fitting Co., Cleveland, O., on a bid of $2638.08; National Screw & Manufacturing Co., Cleveland, O., on a bid of $1718.01; Aircraft Products Co., Clifton Heights, Pa., on a bid of $749; E. W. Ferry Screw Products, Inc., Brookpart, O., on a bid of $261.50; Sanford Aircraft, Inc., Inglewood, Calif., on a bid of $1308.70; Aero Bolt & Screw Co., New York, on a bid of $458, and Air Associates, Inc., Teterboro, N. J., on a bid of $314.50.

For 2200 feet hose (49-1226).:
United States Rubber Co., New York, on a bid of $9435.60.

For fitting assemblies (49-1225):
Companies sharing—J. R. Hunt & Co., Inc., Baltimore, on a bid of $2795.12; Parker Appliance Co., Cleveland, O., on a bid of $2085; Weatherhead Co., Cleveland, O., on a bid of $23,686; Ohlson International Corp., Long Island, N. Y., on a bid of $1108.80; Resistoflex Corp., Belleville, N. J., on a bid of $1137; Aeroquip Corp., Jackson Mich., on a bid of $1150, and Aircraft Fitting Co., Cleveland, O., on a bid of $1489.

For adapters, clips, elbows, etc., (49-1219):
Companies sharing—Aircraft Products Co., Clifton Heights, Pa., on a bid of $222; Adel Precision Products Corp., Huntington, West Va., on a bid of $1053; Collord Inc., Detroit, on a bid of $1750; Aircraft Fitting Co., Cleveland, O., on a bid of $342; Air Associates, Inc., Teterboro, N. J., on a bid of $1421.40; Western Washer & Stamping Co., Los Angeles, on a bid of $5132.25; George K. Garrett Co., Inc., Philadelphia, on a bid of $897.50; H. K. Metal Craft Manufacturing Co., New York on a bid of $4336.75, and Detroit Bolt & Nut Co., Detroit, on a bid of $74.25.

For magnetron tuning kits (49-980):
Electronic Associates, Inc., Long Branch, N. J., on a bid of $8540.05.

For 2389 pressure gages (49-556):
McGrath & Co., St. Paul, Minn., on a bid of $33,737.55.

For capacitors (49-265):
Companies sharing—Sangamo Electric Co., Springfield, Ill., on a bid of $10,199.50; Concord Radio Corp., Chicago, on a bid of $363; Gudeman Co., Chicago, on a bid of $480.

For 3370 adapters (49-1034):
Companies sharing—Neptune Electronics Co., New York, on a bid of $870; Selectar Industries Inc., New York, on a bid of $1935.15, and Kings Electronics Co., Inc., Brooklyn, N. Y., on a bid of $805.

For denatured & furfuryl alcohol (49-1353):
Companies sharing—Lac Chemicals, Inc., Culver City, Calif., on a bid of $79,750.32, and Quaker Oats Co., Chicago, on a bid of $23,170.31.

For 2350 indicators (49-782):
Bendix Aviation Corp., Teterboro, N. J., on a bid of $257,983.

For 311,920 gal. paint remover (49-859):
Companies sharing—Moran Paint Co., Dayton, O., on a bid of $45,381.45, and Turco Products, Inc., Los Angeles, on a bid of $185,595.

For 175 dynamotor test sets (49-1051):
Mercury Electric Corp., Kansas City, Mo., on a bid of $89,356.05.

For adapters (49-1151):
Phaostron Co., South Pasadena, Calif., on a bid of $54,947.48.

For wolf fur strips (49-1184):
Schneir & Co., New York, on a bid of $30,000.

For bushing (49-1218):
Companies sharing—Aero Bolt & Screw Co., New York, on a bid of $225. Crocket Manufacturing Co., Culver City, Calif., on a bid of $503.25; Badgett Steam Lubricator Co., Chickasha, Okla., on a bid of $882; Marman Products Co., Inc., Inglewood, Calif., on a bid of $3942.20, and Aircraft Fitting Co., Cleveland, O., on a bid of $918.

For one air compressor (49-1308):
Chicago Pneumatic Tool Co., Detroit, on a bid of $10,049.

For 220,000 cap assemblies (49-1310):
Companies sharing—Electric Sprayit Co., Sheboygan, Wis., on a bid of $7370, and Peerless Industries, Inc., Plymouth, Mich., on a bid of $1947.

For synthetic rubber sheets (49-1313):
Companies sharing—Dryden Rubber division, Sheller Mfg. Corp., Chicago, on a bid of $2651.10; Anchor Rubber Co., Dayton, O., on a bid of $5380.50; Acadia Synthetic Products, Chicago, on a bid of $740; Firestone Industrial Products Co., Akron, O., on a bid of $1870; Quaker Rubber Corp., Philadelphia, on a bid of $72.80, and Continental Rubber Works, Erie, Pa., on a bid of $6890.

For aircraft bolts (49-1235):
Companies sharing—National Lock Company, Rockford, Ill., on a bid of $2539.19; Ferry Brothers, Cleveland, O., on a bid of $2588.75; Aircraft Hardware Mfg., Co., Inc., Bronx, N. Y., on a bid of $9522.50, and Lamson & Sessions Co., Cleveland, O., on a bid of $281.60.

For 36 adapter magazines (49-1395):
Companies sharing—John M. Wall, Inc., Syracuse, N. Y., on a bid of $2250, and Browning Laboratories, Inc., Winchester, Mass., on a bid of $3187.80.

For 273,650 clamps, nuts, etc. (49-1208):
Companies sharing—Adel Precision Products Corp., Huntington, W. Va., on a bid of $515.20; Trine Manufacturing Co., Richmond, Ind., Union, N. J., on a bid of $1335; American Chain & Cable Co., Inc., Detroit, on a bid of $17,188.35, and Weatherhead Co., Cleveland, on a bid of $5725.

For 51,000 aircraft bolts & gaskets (49-1243):
Companies sharing—Aero Supply Manufacturing Co., Inc., Corry, Pa., on a bid of $2832.30; Aircraft Hardware Manufacturing Co. Inc., Bronx, N. Y., on a bid of $6407.50; National Lock Co., Rockford, Ill., on a bid of $2160.80; Phoenix Specialty Manufacturing Co., Inc., Freeport, L. I., N. Y., on a bid of $96; Pacific Piston Ring Co., Los Angeles, on a bid of $190; Deutsch Co., Los Angeles, on a bid of $723.90; L. J. Barwood Manufacturing Co., Inc., Everett, Mass., on a bid of $2872.80; Stanhope Products Co., Brookville, O., on a bid of $700, and George K. Garrett Co., Inc., Philadelphia, on a bid of $105.

For 547,000 clips, grommets, springs, etc. (49-1266):
Companies sharing—Adel Precision Products Corp., Huntington, W. Va., on a bid of $12,850.10; Automotive Rubber Co., Inc., Dertoit, on a bid of $9987; L. J. Barwood Manufacturing Co., Inc., Everett, Mass., on a bid of $416.13; Dzus Fastener Co., Inc., Babylon, N. Y., on a bid of $1134.08; Air Associates, Inc., Teterboro, N. J., on a bid of $38; Monadnock Mills, San Leandro, Calif., on a bid of $1373.60; Weatherhead Co., Cleveland, on a bid of $750; Phoenix Specialty Manufacturing Co., Inc., Freeport, L. I., N. Y., on a bid of $199.50, and George K. Garrett Co., Inc., Philadelphia, on a bid of $1072.25.
Companies sharing—E. J. Willis Co., New York, on a bid of $1857.88; American Pad & Textile Co., Greenfield, O., on a bid of $1035, and Manhattan Marine & Electric Co., Inc., New York, on a bid of $7154.70.

For compound (49-1144):
Companies sharing—Dow-Corning Corp., Midland, Mich., on a bid of $37,630.08; Dyhem Co., St. Louis, Mo., on a bid of $908.16; B. F. Goodrich Co., Akron, O., on a bid of $1996.80, and Glidden Co., Cleveland, O., on a bid of $6289.52.

For 50,000 gaskets (49-1177):
Companies sharing—Linear Inc., Philadelphia, on a bid of $27,978.12, and Parker Appliance Co., Cleveland, on a bid of $17,550.35.

For 5500 parachute assemblies (49-1188):
Lite Manufacturing Co., Inc., New York, on a bid of $87,340.

For 135 indicators (49-1211):
Liquidometer Corp., Long Island, N. Y., on a bid of $4100.28.

For 21 aircraft cameras (49-1265):
S. C. Carter Jr., New York, on a bid of $17,325.

For 600,000 lb. carbon removing cleaner (49-1337):
Madeira Food & Materials Co., Tulsa, Okla., on a bid of $7500.

For 3016 helmets (49-1104):
Paramount Rubber Co., Detroit, on a bid of $53,835.60.

For camera equipment (49-1180):
Companies sharing—J. G. Saltzman, Inc., New York, on a bid of $459.57; N. Teitelbaum Sons, Inc., New York, on a bid of $1485; Holliston Mills Inc., Norwood, Mass., on a bid of 3950; Sun Ray Photo Co., Inc., New York, on a bid of $876.50; Burke & James, Inc., Chicago, on a bid of $1800; Williams, Brown & Earle, Inc., Philadelphia, on a bid of $1223, and Bell & Howell Co., Chicago, on a bid of $1819.

For thermometer indicator (49-1214):
Lewis Engineering Co., Naugatuck, Conn., on a bid of $6251.75.

For 2138 lb. steel (49-1248):
Companies sharing—Firth Sterling Steel & Carbide Corp., McKeesport, Pa., on a bid of $2254.98, and Latrobe Electric Steel Co., Latrobe, Pa., on a bid of $1695.08.

For static connector (49-1276):
Vargo Manufacturing Co., Inc., Garland, Tex., on a bid of $78,410.

For photographic paper (49-1276):
Companies sharing—Haloid Co., Rochester, N. Y., on a bid of $12,460.48; Anken Chemical & Film Corp., Newton, N. J., on a bid of $485.76, and Grant Photo Products, Inc., Lakewood, O., on a bid of $1610.

For 3213 solenoids (49-1286):
Consolidated Radio Products Co., Chicago, on a bid of $20,434.68.

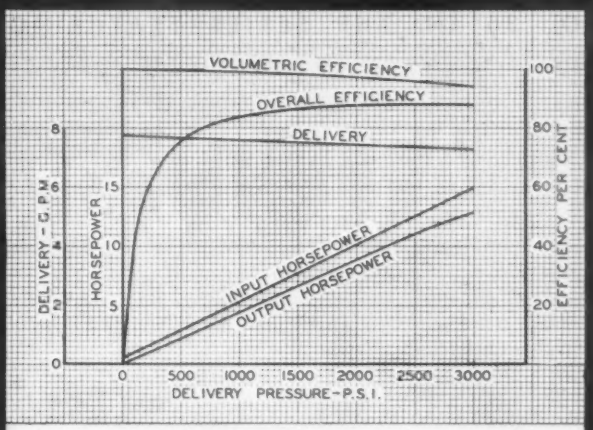
For 90,000 dehydrator plugs (49-848):
Niles-Bement-Pond Co., W. Hartford, Conn., on a bid of $13,500.

VICKERS

CONSTANT DISPLACEMENT

PISTON TYPE PUMPS

have many advantages



Curves are for Vickers Aircraft Piston Type Constant Displacement Pumps Model PF-3911 Series at 3600 rpm using approved AN aircraft type hydraulic fluid.

HIGH EFFICIENCY

LOW WEIGHT

LONG LIFE

SIZES TO 40 hp

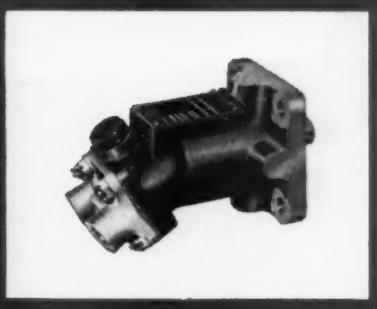
PRESSURES to 3000 psi

Listed at the left are the important reasons why Vickers Constant Displacement Piston Type Pumps are so widely preferred for modern aircraft hydraulic circuits.

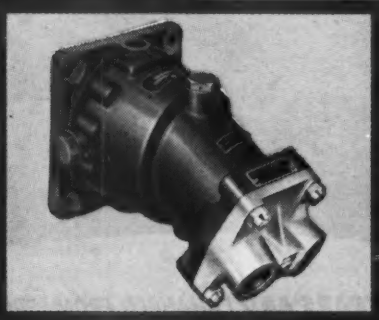
Note particularly the typical performance curves that prove the very high volumetric and over-all efficiency of these pumps. Extremely high horsepower to weight ratio is also important . . . 1.96 hp per lb for the Model PF-3911 Pump operating at 3000 psi and 3750 rpm. Dependability is another feature . . . airline life in excess of 10,000 hours has been reported. Each of the six basic model series shown here is available in four sizes (angles) for continuous duty at pressures to 3000 psi.

Ask for new Bulletin 49-53 describing "The Most Complete Line of Hydraulic Equipment for Aircraft."

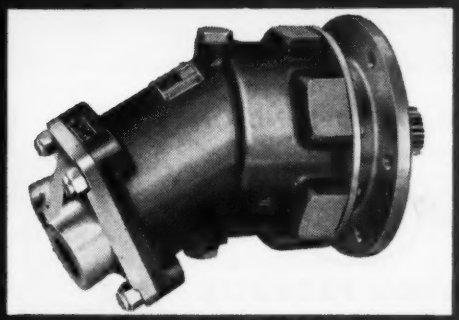
Vickers Model PF-3911 Series for 3000 psi



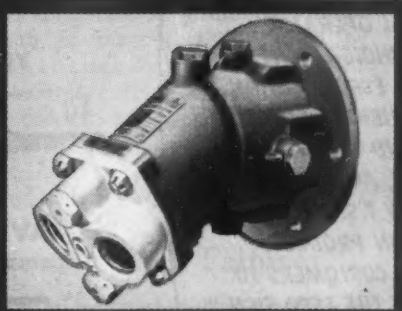
Vickers Model PF-3906 Series for 3000 psi



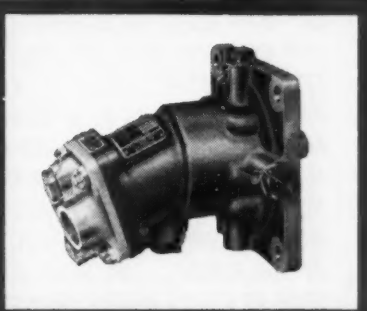
Vickers Model PF-3913 Series for 3000 psi



Vickers Model PF-3918 Series for 3000 psi



Vickers Model PF-3915 Series for 3000 psi



Vickers Model PF-3909 Series for 3000 psi

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1 **"BECAUSE OF OUR CONFIDENCE** IN ESSO PRODUCTS WE DECIDED ON ESSO AVIATION FUELS AND LUBRICANTS EVEN BEFORE OUR PRESENT MODEL HELICOPTER WAS READY TO FLY."

George Townson, Test Pilot (Left)
Helicopter Engineering Research Corp.
Philadelphia, Pa.

2 **"THOSE ESSO WINGS** ARE A WELCOME SIGHT TO ME. I'VE USED A PLANE FOR SEVERAL YEARS—FLYING ALL OVER THE EAST...AND I'VE NOTICED MANY OF THE AIRPORTS THAT PRIDE THEMSELVES ON GIVING SERVICE BACK IT UP WITH ESSO AVIATION PRODUCTS."

James R. Affleck (Center)
William Penn Flour Mills Co.
Philadelphia, Pa.

3 **"15 YEARS AGO** I CHANGED FROM 'SPORTSMAN FLIER' TO 'COMMERCIAL OPERATOR'... AND ESSO HAS BEEN MY FIRST CHOICE RIGHT FROM THE START. TODAY, I FEEL ESSO AVIATION GASOLINE AND OILS HAVE CONTRIBUTED GREATLY TO OUR HIGH SAFETY RECORD AND LOW MAINTENANCE COSTS FOR FIVE YEARS, AND OVER 50,000 HOURS OF C.P.T. AND W.T.S. PROGRAMS. WE NOT ONLY SELL ESSO AVIATION PRODUCTS AT OUR FIELDS... WE URGE OUR CUSTOMERS TO STOP AT FIELDS WHERE THEY SEE THE ESSO SIGN."

Richard Bircher, Airport Operator (Right)
Boulevard Airport
Philadelphia, Pa.

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ESSO

AVIATION PRODUCTS

SOLD IN THE 25 STATES INDICATED

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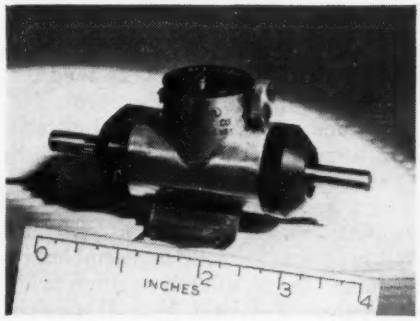
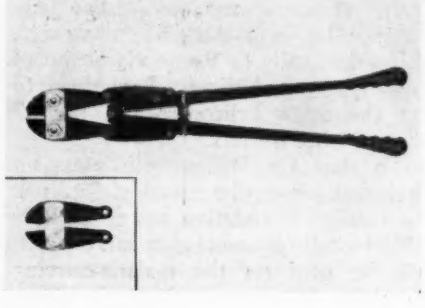


Adjustable-Speed Drive

For recorders, controllers, computers, indicating mechanisms, and similar devices, new miniature variable-ratio speed changer offered by **Metron Instrument Co.**, 432 Lincoln St., Denver 9, Col., is small packaged unit weighing less than 6 oz., yet can deliver up to 70 oz.-in. torque and .025 hp. Unit's ratio of input to output speeds is infinitely adjustable between 1:6 increase and 6:1 decrease, with a total speed range of 36 to 1. A dial and pointer indicate ratio setting and adjusting knob is equipped with friction drag to prevent ratio wander. Maximum output torque is obtainable at zero speed and operating speeds as high as 20,000 RPM are practical. Adjustable speed drive complements Metron fixed-ratio speed changer; having same body diameter, mounting foot, and shaft height above mounting surface. Fixed-ratio gear sections can be supplied integral with variable-ratio unit any nominal output speed range.

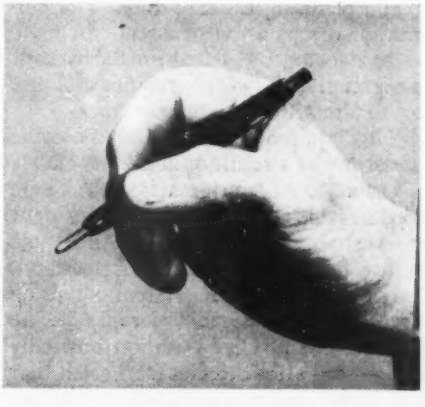


Bolt Cutter

New special center cut bolt cutter with chisel type jaws for cutting case hardened bolts, chain, reinforcing rod, and other hard materials has been developed by **Manco Manufacturing Co.**, Bradley, Ill. Jaws are forged tool steel, especially heat treated for this type work. Through compound leverage, tool affords two tons cutting power at jaws with 50 lb. pressure at handles. Unit is available in 18 in., 24 in., 30 in. and 36 in. size with capacities up to $\frac{7}{16}$ in. solid rod. Head assembly can be obtained separately and will fit standard bolt cutters now used.

Cleans Aircraft Surfaces

Intended primarily for commercial aircraft use, new A-5 compound for brightening skin surfaces in extremely bad condition, removing unusually heavy deposits of oxides, and cleaning bad cases of corrosion, is offered by **Aviation Division, Cee-Bee Chemical Co., Inc.**, 655 E. Gage Ave., Los Angeles 1, Calif. Dilution for these "tough" jobs is 1 to 5 with water. When diluted 1 to 10 with water it serves as routine brightening material. Compound is represented as completely safe on aluminum.

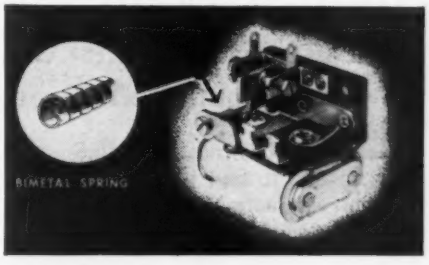


Removes Metal Particles

New magnetic probe made of supermagnetic alloy and no larger than a fountain pen is useful for removing metallic foreign matter from delicate mechanisms or other hard-to-reach places. Offered by **General Scientific Equipment Co.**, 2700 W. Huntingdon St., Philadelphia 32, Pa., point of magnet can be extended or retracted from bakelite case by turning end knob. Strength of magnet is controlled by amount of extension. Probe also can be used to test coated surfaces for magnetic properties of under-material or for extracting metal particles from skin tissues. Unit is provided with pocket clip and sells for $6.50.

Prevents Switch Failure

New safety push-button, providing positive means of making or breaking electrical contact when main contacts stick or fail to operate, has been designed by **Robert Hetherington & Son, Inc.**, Sharon Hill, Pa. Unit incorporates two sets of auxiliary contacts so that if main contacts fail to operate, button can be pushed further to make auxiliary contact. If main contacts stick in "on" position, button can be physically pulled off contact. Unit is rated at 20 amp., 30v. d.c. Manufacturer recommends it for use in critical circuits.



Sensitive Relay

Developed for battery charge control by **Sigma Instruments, Inc.**, 45 Ceylon St., Boston, Mass., temperature compensated relay, using bimetal spring, gives operation at constant voltage regardless of temperature, or at decreasing voltage with rising temperature. With 25 milliwatts operating power, device's voltage settings are stable to ±1 percent. Windings are available for all common charging voltages. Construction enables relay to operate at essentially constant voltage from −50 C. to +85 C. Adjustments are offered for voltages from .01 volt up, at sensitivities of 5 to 25 milliwatts.

Quick Polisher

New "Multi-Barrel Tumbler," intended for mass-finishing of metal and plastic products, deburs and polishes up to 15 different items at the same time. Offered by **Hungerford Corp.**, Big Flats, N. Y., machine is designed to tumble each item in manner best suited to its requirements. Variables include: wet and dry tumbling; wide range of speeds; rotary, centrifugal and end-to-end actions; and combinations of these actions. A circular mounting plate, with multiple perforations at the center and six distances from center for attachment of the barrels, is rotated at a fixed speed. The

AVIATION WORLD NEWS

Melbourne Letter:

Highest Load Factor, Lowest Fare

Australian airlines carry one-sixth total population in 12-month period; overall fare average 4¢ per mile.

Melbourne—Australian airlines are not surprised to find themselves at the top of an international tabulation drawn up by Aviation Research Institute. In case you haven't seen it, Australian National Airways placed first among major national airlines for passenger load factor. Qantas Empire Airways ranked third. And Trans-Australia Airlines shared fourth place with Trans-Canada and U. S. airlines.

On a composite rating basis, taking five operating criteria into account, Australian airlines slipped slightly toward the tail end of the list, but the fact remains that Australian operators have been able to build up an overall load factor (and operating profit) that is not duplicated by many lines.

▶ **Civilian Airlift**—This phenomenon is perhaps not unrelated to another test of civil aviation power which Aviation Research Institute did not attempt to cover in its survey. Australian statistics show that domestic airlines lifed one-sixth of the whole population in recent twelve months, giving every Australian —whether flying or not—a statistical average of 72 air miles. This is probably a world record on both counts. And Australia may possibly claim the lowest overall passenger fare in the world—about 4 cents a mile.

It is likely that new load factor records will be revealed in returns covering current operations. The airlines are bumping against a ceiling on fuel consumption and fleet expansion—imposed because of the shortage of dollars for imports of gasoline and planes—and additional passenger miles must come out of the unused load potential of about 30 percent.

Though passengers carried, load factor and profits so far appear to have been in about the same inverse relation to passenger mile rates (or rather their cheapness in terms of other forms of transport), rising operating costs begin to press home the law of diminishing returns and to establish a separate profit curve with a marked downward dip. The airlines try to meet this situation by shedding expensive "frills."

▶ **Bookings High**—Although a series of crashes and near crashes has marred Australia's unique air safety record, booking offices remain as crowded as ever. But the recent sharp ascendancy of TAA shows that an unblemished safety record may divert passengers from less fortunate lines. Two or three successive accidents may bite deeply into the traffic volume of a single airline even though confidence in civil aviation as a whole remains unshaken.

Up to the recent series of disasters, the Department of Civil Aviation appeared to have had a fetish for the prevention of collisions between aircraft in the planning for air safety. The emphasis on separation of aircraft by elaborate stacking was based on the type of navigation aids which require the use by all aircraft of one narrow track.

This equipment itself has now come under fire as a result of accidents clearly traceable to off-course navigation. There was, in fact, no single collision accident in Australia. The navigation aids now in use include the 33-megacycle standard blind approach system, homing beacons and the radio compass. The Department of Civil Aviation hurriedly announced after the first fatal crash that the 33-megacycle range was to be replaced by a 112-megacycle VHF four-course range. Equipment of this type has been in Australia for six years, but was never installed. Another form of radio aid, originally slated for installation two years ago, is the Australian-designed DME (Distance Measuring Equipment). This is a pulse relay (radar) system and marks the first departure from continuous wave navigation aids. But when used in conjunction with the four-range course, it still presents the problem of plane separation.

▶ **Replacement Problem**—Meanwhile, accidents due to engine failure have presented a new headache. One disaster in New Guinea has been traced to faulty war-time metallurgy, but no explanation has been offered why the defective engine part was not replaced as directed by the Department of Civil Aviation. There is a general suspicion that proper maintenance has become increasingly difficult through lack of spares and replacements. Even though dollars are ungrudgingly appropriated for imports of aircraft parts, red-tape delays deliveries.

There is also the much more important problem of obtaining replacements for the part of Australia's civil air fleet that is now approaching obsolescence. Since the war no British passenger planes have been available for main route operation. Some American planes have been purchased from European operators, but these have been used for expansion rather than replacement. No direct orders for American civil aircraft have been licensed since 1946.

▶ **Small Production**—Apart from the Drover feederline plane built by de Havilland's branch plant, no civil aircraft is at present made or assembled in Australia. In the military aviation field, production of World War II models is ticking over at the rate of one or two a month for each service type. The program has been expanded by addition of the Nene-powered de Havilland Vampire. The first unit is expected to be ready for tests soon. It will be a long time before Australia can make any sizeable display of these fighters. Plans are for construction of 50 Vampires and 60 Nene jets of 5000-lb. thrust.

Production of other jet types, including a much-touted jet bomber, is not yet beyond the initial planning stage. This bomber was to be developed by the Beaufort (bomber-building) division of the Department of Supply.

—**Herbert Leopold**

Europe Air Aid

Use of American helicopters and planes to spray and dust European crops is opening a new market for American aircraft makers—one which ECA is helping to foster.

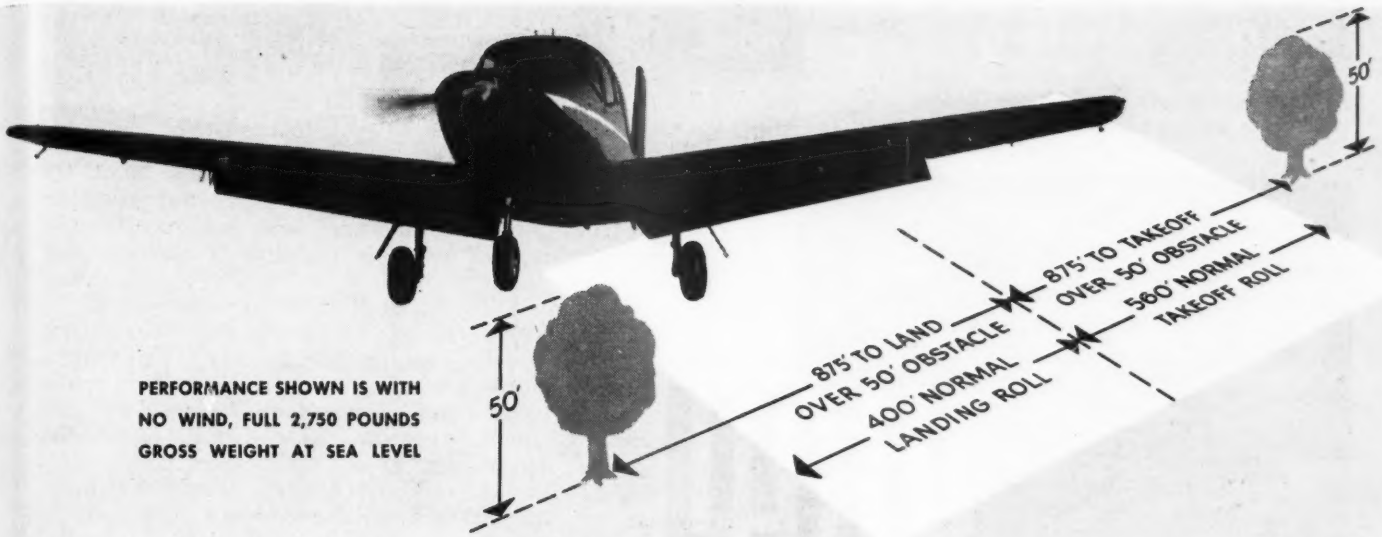
Thus far three Bell Model 47 helicopters and 17 Piper PA-11 dusters have been bought by France and Italy. Italy has already received its two helicopters by trans-Atlantic air cargo, shipped directly to Rome via Seaboard and Western Airlines. France is to get the other helicopter and the 17 Piper 90 hp. dusters.

To start the Italian helicopters on their first job on the island of Sardinia, Rockefeller Foundation has given Italy $5000 worth of insecticide spray which will be used on the malaria-carrying anopheles mosquito and on the dacus fly which attacks olive crops. The Foundation also financed the training of three Italian helicopter pilots in the flight and maintenance course at Bell Aircraft's Niagara Falls (N. Y.) plant.

Bell expects about $100,000 of the helicopters' cost will come from ECA. They are priced at $63,000 each. Bell has also received another $50,000 in ECA funds for 75 prime movers (motorized wheelbarrows) for delivery to Western Europe, and additional orders for 100 more are expected.

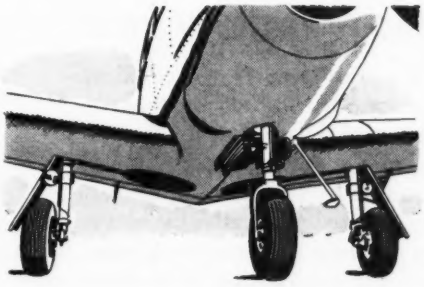
SPEAKING OF SHORT-FIELD PERFORMANCE!

THE '49 RYAN NAVION IS IN A CLASS BY ITSELF!

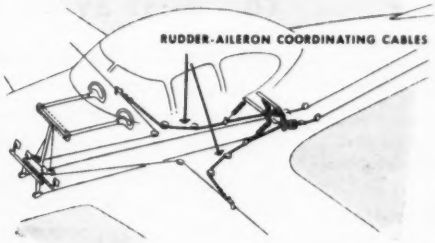


PERFORMANCE SHOWN IS WITH NO WIND, FULL 2,750 POUNDS GROSS WEIGHT AT SEA LEVEL

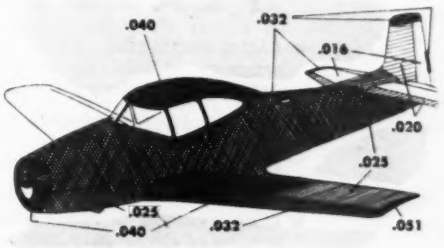
DON'T WORRY if that smooth, concrete runway is miles from where you want to go. A *Ryan Navion* will take you into short, rough strips... and out again, with ease and safety. Think of it! *Navion* lands at only 54 m.p.h. with full gross load. Its high-lift, full-deflection flaps lower 43° to make possible slow, steep approaches. Only 875 feet are needed to clear a 50-ft. obstacle—both on landing and take-off. *Navion's* husky 205 h.p. engine will give you 900-ft. of altitude in your *first minute* of flight! Performance like this is mighty important to the man who wants a rugged, versatile plane with plenty of utility that'll get him there and put him down right where he's needed. Yes, *Navion's* short-field performance is a big reason why it's the growing favorite among businessmen pilots.



WIDE WHEEL TREAD and high ground clearance...big, steerable balanced nosewheel and oversize tires enable you to set the *Navion* down smooth as velvet on rough, soft fields, even in cross winds. Big, equalized hydraulic brakes ease ground-handling. Deep-stroke hydraulic shocks are real heavyweights.



SAFE, AND EASY-TO-FLY, the 155 m.p.h. *Navion* has amazing stability, is gentle and well-behaved..."forgives" pilot error short of foolhardiness. It features "two control after take-off"...yet you have rudder when you want it. Stall-resistant wing gives aileron control *below* stalling speed for safety.



BIG AND RUGGED, the thick-skinned, all-metal *Navion* represents highest structural integrity in aircraft design. Low maintenance cost and permanent beauty are assured. Send now for colorful, FREE brochure which gives complete details on all 29 dramatic advancements in *Ryan Navion* for '49.

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

Ryan Navion

Rely on Ryan RYAN AERONAUTICAL COMPANY

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STANDARD FEATURES LIKE THESE GIVE YOU NAVION COMFORT AND CONFIDENCE

- All-Around Sound-Proofed Cabin
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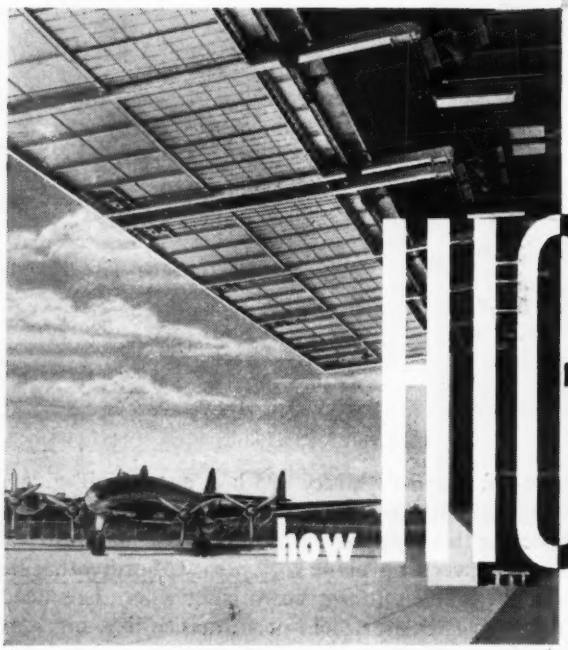
- Center Arm Rest in Rear Seat
- Recessed Arm Rests
- Thicker Foam Rubber Cushion
- 4 Individual Side Ash Trays
- Easy-Entrance Roll Back Canopy
- Thicker Plexiglas Windshields
- VHF Radio
- Improved Control Panel
- More Instruments
- Dual Fuel System

how WIDE do you want hangar doors?



how HIGH do you want hangar doors?

FEATURES

- **CABLES PROTECTED.** All supporting cables are protected from exposure to the weather by being located on the inside of the building.
- **MINIMUM COUNTERWEIGHTS.** The lower leaf of the door only is counterweighted so that the load on the cables is approximately one-half the total load of the door.
- **CONSERVATION OF HEAT.** Normally only a portion of the extreme door height is required and frequently this can be obtained by raising only the bottom leaf.
- **FOR ALL SIZES OF OPENINGS.** The Truscon Vertical Lift Canopy Hangar Door can be built to extreme heights and widths, in as many individually-operated sections as desired, without posts of any kind between the sections.

Truscon Vertical Lift Canopy Doors can meet every requirement you have

The Truscon Vertical Lift Canopy Door is of structural frame design divided horizontally in two sections or leaves, the upper leaf hinged, near the top, to the supporting steel with heavy hinge pin castings, and the lower leaf arranged to slide up and in back of the upper leaf. In operation the lower leaf is raised vertically, by means of cables, to approximately one-half the opening height, at which point both leaves tilt outward so as to form a canopy in the extreme open position. No portion of the door encroaches on the storage space within or on the apron space outside the building. This is particularly important since it is impossible for anyone operating the controls on the inside of the building to see any obstruction on the apron outside.

DESIGN SERVICE. Write for free illustrated literature giving full details of Truscon Vertical Lift Canopy Doors. Experienced Truscon hangar door engineers can help in efficient planning of your jobs—ask for their assistance.

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Manufacturers of a Complete Line of Steel Windows and Mechanical Operators • Steel Joists • Metal Lath • Steeldeck Roofs • Reinforcing Steel • Industrial and Hangar Steel Doors • Bank Vault Reinforcing • Radio Towers • Bridge Floors.

Should U. S. Pick Airline Heads?

Commerce committee chairman suggests Federal naming of top officers of government-backed lines.

Government appointment of the top officials of government-financed airlines has strong support among members of the Senate Interstate and Foreign Commerce Committee, now conducting a comprehensive investigation of airline finances.

The proposal was broached by the committee's chairman, Sen. Edwin Johnson (D., Colo.), during the testimony of Harvey Gunderson, Reconstruction Finance Corp. Director. Gunderson said the while RFC aims to assure "good management" in airlines to which it proposes granting loans, "we try very hard not to dictate to the companies".

► **Government Dictation**—"I do not see any reason for being too conscientious about not dictating," Johnson declared. "[Former Secretary of Commerce] Jesse Jones put men of his own choice in the management of government-financed railroads and had splendid results. This indicates that it was a sound policy. The policy has also been followed in banking."

Besides Gunderson, witnesses in the committee's investigation included Civil Aeronautics Board Chairman Joseph O'Connell; Civil Aeronautics Administrator Delos Rentzel; former CAB Chairman James Landis; Roger Murray, vice president, Bankers Trust Co. of New York; J. Weldon Jones, assistant director, Bureau of the Budget; James Fischgrund, chairman, National Independent Air Carriers; and Sen. Wayne Morse (R., Ore.).

► **Subsidy Division**—The hearings have made clear that a fundamental problem in the air transport field is to determine which airlines and which routes are government-subsidized, and to what extent. This determination is required before two matters of primary concern to the committee can be properly decided: whether airline competition should be cut back through mergers or certificate revocations; and whether the government should inject itself into the management of subsidized lines through appointment of officials, salary limitations and cost controls. There is no inclination among committee members to control the managements of non-subsidized companies.

Johnson and other members of the committee are strongly in favor of legislation directing a separation of "service" and "subsidy" payments to airlines. CAB Chairman O'Connell, however, has balked, claiming that the Board would need a year's study to set up yardsticks for determining "service" rates.

Former CAB Chairman Landis recommended that service rates be established for route segments, pointing out that they obviously would vary widely. Under the present method of making lump payments to air carriers, he observed, there is no way of ascertaining subsidized and non-subsidized route segments.

Highlights of other testimony:

• **Profit Limitation**—Private financial institutions will continue to hold back on airline investments as long as CAB's attitude is to hold down profits, banker Murray said. Committee members, however, pointed out that the government could not permit unlimited profits to companies it is supporting.

The latter position was buttressed by Landis' statement that while flying costs have been going down, indirect costs —including those for ticket offices, advertising, promotion, lawyers' fees, etc. —have been mounting and are now 60 percent of total airline expense. But Landis opposed the idea of limiting airline executives' salaries to $25,000 annually.

• **Financing Control**—Murray objected to giving CAB control over airline financing, claiming it would prevent company managements from acting in what they would consider their own best interests. Landis strongly endorsed the proposal as the only way of diverting carriers from debt to equity financing.

• **Mail Subsidy**—Budget Bureau's Jones said that "probably well over half" of the $121 million in mail payments to airlines during the 1949 fiscal year were subsidies. He estimated total Federal outlays related to civil aviation came to $301 million in fiscal 1949.

• **Promotional Loans**—RFC opposed any law change which would require it to make airline loans on any other than a "straight business basis". Johnson had suggested that the national defense factor be weighed in government lending to air carriers.

• **Airways Aids**—Rentzel told the committee that airways aids would go a long way toward solving the airlines' financial problems by paving the way for schedule regularity the year around. Had the Radio Technical Commission for Aeronautics' five-year "transition" navigation aid program been in effect in fiscal 1948, Rentzel estimated that the airline industry would have "broken even" instead of showing a $20 million deficit (before mail pay adjustments). If it is assumed that schedule regularity and safety would increase traffic 33 percent, the industry would show a $30 million annual profit instead of deficits, Rentzel said.

• **Airway Charges**—Budget's Jones anticipated that air carriers would be out of the subsidized category "in a few years" thereby paving the way for establishment of a system of charges for users of airways facilities. At the outside, he said, users should be in a position to pay for these facilities by the time RTCA's "transition" program is completed.

• **Prototype**—CAB Chairman O'Connell, Rentzel, and Sen. Owen Brewster (R., Me.) plumped for legislation along the lines of last year's Brewster-Hinshaw bill setting up a civilian-controlled board to administer a program for the development of transport and cargo planes. Johnson however, suggested that since the Air Force is already undertaking development, "there is no point in moving in two directions". Johnson's view now prevails on Capitol Hill.

Aircoach Setback

Aircoach expansion plans of Northwest Airlines and TWA have suffered a major setback.

Civil Aeronautics Board has refused to permit Northwest to extend its present transcontinental coach flights to the Washington-Twin Cities and Twin Cities-Chicago links. NWA planned to operate 36-passenger Martin 2-0-2s over the two routes.

► **Tariffs Suspended**—Capital Airlines had complained that Northwest could not make money with the 2-0-2s at four cents a mile fares even if the Martins operated with 100 percent load factors (AVIATION WEEK, Apr. 25). NWA uses 55-passenger DC-4s on its New York-Seattle coach flights, and Capital uses 60-passenger DC-4s.

TWA's proposed extension of its Los Angeles-Kansas City DC-3 skycoach service to the Kansas City-New York and Los Angeles-San Francisco runs was also suspended for 90 days pending an investigation. (Boeing Stratoliners, in addition to the 24-passenger DC-3s, would have been used for the new low-fare flights.) Despite United Air Lines protest, CAB permitted TWA to continue until July 31 its present Los Angeles-Kansas City coach operations.

First Quarter Reports Are Bright

Cracking traffic records in wholesale fashion, American Airlines, largest domestic operator, is winging toward its normally profitable summer season unhampered by heavy wintertime losses.

Rosy prospects for remainder of 1949 were strikingly disclosed in a first-quarter report showing overall revenues up 48 percent compared with same period last year. (Expenses were up 15 percent.) An adjusted $4,285,000 net loss for the first quarter of 1948 was chopped down to a modest $222,500 in same months of 1949.

▶ **Profit In March**—AA showed a March operating profit of $458,000, and with the aid of April earnings expects to be in the black for the first four months of the year. In 1948, the carrier suffered an operating loss of $374,000 in April. March profit was the first for the month since March, 1945.

Booming passenger, freight and mail traffic account for American's fast flight out of the red. First quarter revenue passenger miles were more than 38 percent over same 1948 period. Cargo ton miles increased 41.5 percent to a new peak. Mail tonnage was far ahead of last year's levels.

Passenger load factor for first quarter 1949 was 61.9 percent compared with 57.7 percent in March quarter of 1948. Of the $7,016,000 total revenue increase reported by American during the first quarter 1949, passenger traffic accounted for $5,778,000.

▶ **Safety Record Helps**—Contributing materially to AA's good passenger business in the past winter was the unmatched safety record of the industry and the company. American hasn't had a passenger fatality for more than three years, and U. S. certificated airlines as a whole were completing their eighth crash-free month last week. First-of-the-week family fare plan, originated by AA, also figured in the company's high passenger traffic level during first quarter of 1949.

American received several million dollars less mail pay last year than its two principal transcontinental competitors—TWA and United Air Lines. Together with Eastern Air Lines, American has accepted, in principle, CAB's finding that it should continue to operate on a non-subsidized, "service" mail rate.

Other bright spots in the airline traffic and financial picture:

• **Northwest** reported new records for first quarter passenger revenues both domestically and on its Pacific routes. Loss was cut by about $500,000.

• **Chicago & Southern** announced a systemwide net profit after taxes of $36,021 in first quarter 1949 against a $20,000 loss in same period last year. Operating revenues were up 33 percent; expenses increased 29 percent.

• **Colonial** has informed stockholders that first quarter losses this year will be under 1948 levels.

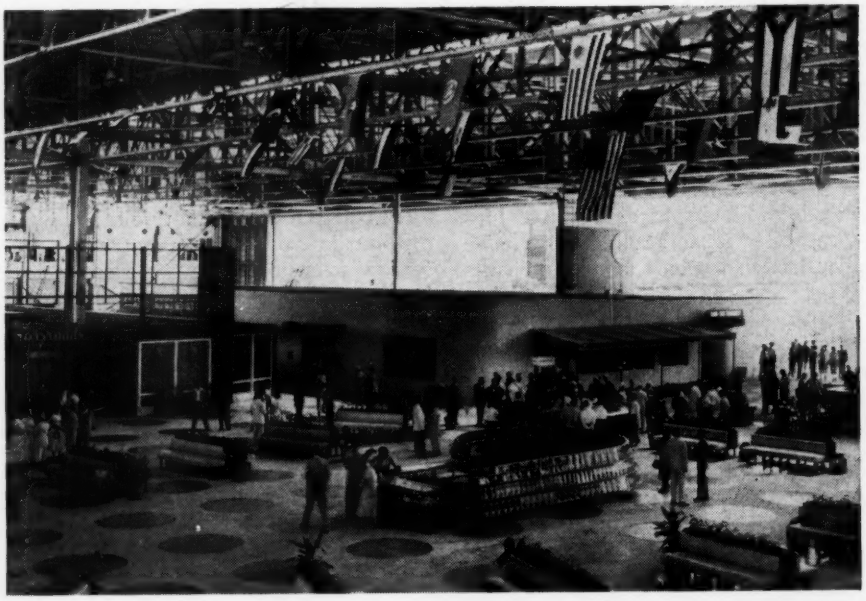
• **Continental** revenue passenger mileage increased 13.8 percent and passenger revenue 13.6 percent during first quarter 1949 compared to same period last year. Freight revenue was up 69 percent.

Insurance Eased

Airline pilots are finding it easier to get life insurance, but must still pay higher premiums than the average person. Ninety-three of 100 life insurance companies surveyed at the start of this year, grant life insurance to pilots and crewmen on scheduled airlines in the U.S., and 80 grant insurance to flight personnel in domestic nonscheduled commercial services, the Institute of Life Insurance reports.

Some limitations still apply to the writing of policies on airline flight personnel, most common being amount of insurance issued plus extra charge per $1000 for that granted. In the case of flight personnel on scheduled domestic lines, policy limits most frequently set today are $25,000 (two and one-half times the 1935 limits), while extra premium per $1000 today is usually $3, compared with $25 in 1935. For pilots and crewmen of nonscheduled domestic carriers, including taxi and charter services, most common limits are $25,000 on policy size and $5 extra per $1000, compared with $10,000 maximum and $25 extra premium in 1935.

In the case of flight personnel on western hemisphere routes, 74 of the 100 companies now insure applicants. With reference to world-wide flights, 52 of the 100 companies now insure applicants.



Puerto Rico Gets Plush Terminal

(McGraw-Hill World News)

SAN JUAN, P. R.—Converted from U. S. Navy hangar, a million-dollar terminal with air-conditioned Clipper Club cocktail lounge and de luxe passenger facilities recently opened at Isla Grande airport near San Juan. Clipper Club, on second floor of terminal, was built by Pan American and seats 200.

A large restaurant, two cafeterias, soda fountain, observation platform, stores, barber shops, beauty parlors, cable offices, public telephones, check room, and show rooms for Puerto Rico-manufactured articles are among terminal facilities.

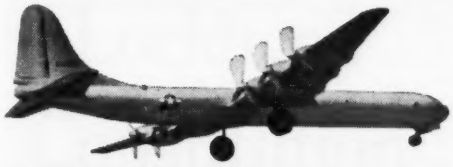
▶ **Cut Inspection Red Tape**—Outgoing baggage will be inspected at terminal, eliminating wait for baggage inspection at any point in continental U. S.

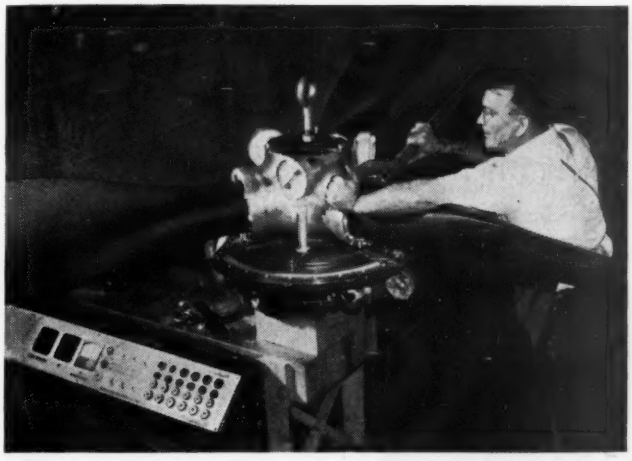
Facilities have been installed for customs inspection, immigration, public health, air communications center, and observation platforms. Airlines counters have belt for carrying outgoing baggage.

Pan American, Eastern, Caribbean Atlantic, Air France, and 18 nonscheduled lines will use the terminal.

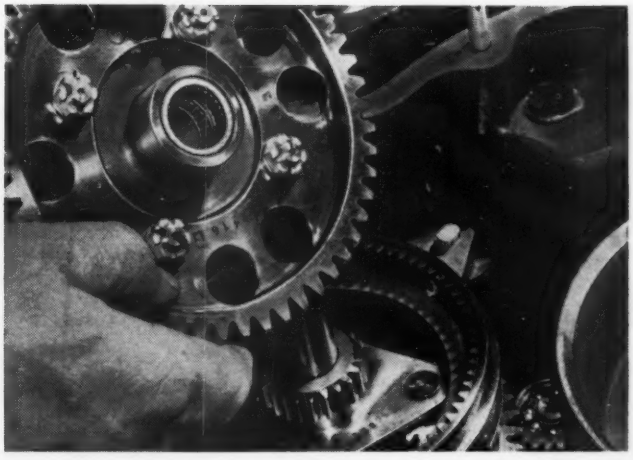
New terminal is ten times larger than the old structure (built by Pan American in 1935) which handled 297,000 passengers and over 12 million lb. of cargo last year. Old terminal will be transferred to Puerto Rico National Guard.

Torrington Needle Bearings provide compact, rugged design for Curtiss-Wright B-36 propellers



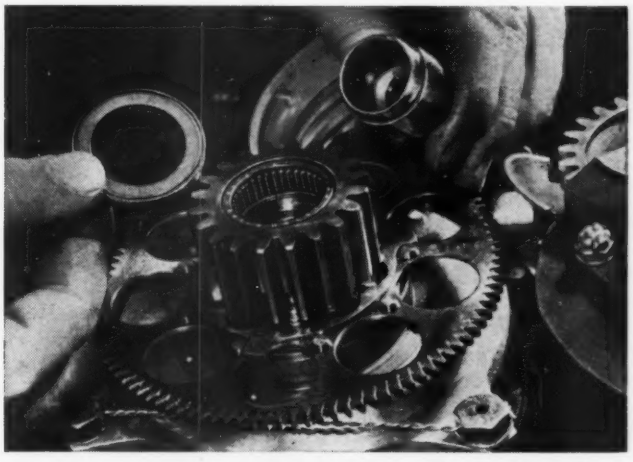


Space is at a premium in the pitch control mechanism of the Curtiss-Wright C636S propellers used on the B-36. Essential, too, are lightweight design and rugged construction. Torrington Needle Bearings are used in this mechanism because they provide exceptional compactness and load capacity.



Rotating continuously at 1600 rpm, the drive gear assembly operates efficiently on high-capacity Needle Bearings. During pitch change, each bearing carries radial loads of nearly 400 pounds. The full complement of rollers provides a high factor of reliability and assures long service life.

Three large worm gear shafts are mounted on Needle Bearings, and housings are kept relatively small. Stationary during fixed pitch operation, these gears need the high static non-brinell capacity of Needle Bearings—plus their smooth anti-friction operation at 1200 rpm during blade feathering.



Lubrication is no problem with Needle Bearings. Take this braking assembly as an example. The lips of the bearing ride close to the shaft and help conserve lubricant. The Needle Thrust Bearing, at the left, is specially designed for this application to provide compactness and high thrust capacity.

To keep *your* aircraft light for flight, rugged for safety and efficient for low maintenance and long service, use Torrington Needle Bearings. Let our engineers help you with any related design or installation problems. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices in principal cities.

TORRINGTON *NEEDLE* **BEARINGS**

Needle • Spherical Roller • Tapered Roller Straight Roller • Ball • Needle Rollers

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The Lockheed Constitution

NAVY'S

TWIN-DECK

TRANSPORT

The massive Lockheed Constitution heralds the coming low-cost air age. It will carry people far more economically than any other airplane flying today.

Five years ahead of its time, the Lockheed Constitution is an entirely new concept in intercontinental air transport.

It was designed and built for the U. S. Navy, which is now operating the huge twin-deck aircraft on transcontinental evaluation flights.

Lockheed

AIRCRAFT CORPORATION

Look to Lockheed for Leadership

The Constitution, which will carry 180 passengers, is currently on an exhibition tour of the principal cities of the United States.

Mail Pay Offer

But CAB raps American Overseas, Pan American on Atlantic expansion.

A blunt lecture on over-expansion of trans-Atlantic operations has accompanied a Civil Aeronautics Board offer of more than $15 million back pay to Pan American Airways and American Overseas Airlines.

U. S. flag trans-Atlantic services to date—and the carriers' estimates for the future—all point to increasing dependence on governmental support, CAB declared. It added that this unhappy development has taken place despite phenomenal expansion in both traffic volume and capacity operated, a condition which normally would be indicative of business success and prosperity.

▶ **No Reversal of Trend**—Past experience indicates further expansion is unlikely to reverse trend toward greater dependence on government subsidy, CAB continued. "On the contrary, the leveling off of traffic demand (at regular rates) compels the conclusion that further expansion in capacity can be utilized only through sharp fare reductions—with no promise of lower unit costs to support the reduction in rates. The (mail pay) section of the Civil Aeronautics Act is not a blank check which airline management may fill in for any amount found necessary to support whatever quantity or type of service management sees fit to operate."

CAB said that ultimate responsibility for determining volume and character of service which should be underwritten (by mail pay) as necessary in the interests of commerce, postal service and national defense rests with the Board, not with carriers. "If management plans expansion beyond the volume of service found (by CAB) to be in the public interest, management must find ways to cover the extra costs with revenues derived from the users of the service rather than from increased government subsidies."

▶ **Study Undertaken**—The Board declared that in view of the discouraging subsidy requirement trends of North Atlantic operations, establishment of permanent mail rates for the future would be deferred. Within 60 days CAB plans to re-evaluate the operations of North Atlantic carriers and will announce a program for reducing dependence on subsidy.

But the Board offered PAA an additional $12,783,000 and AOA an additional $2,346,000 as final mail payments for trans-Atlantic operations during 1946, 1947 and 1948. Adjustment brings Pan American's total mail pay for the three-year period to $24,635,000 (83.1 cents a revenue plane mile) and AOA's payment to a total of $10,146,000 (55.5 cents a revenue plane mile). These rates are designed to give both companies a 7 percent profit on recognized investment for the three years.

▶ **Strike Loss Policy**—In a significant policy decision, CAB denied AOA's contention that the loss due to the three-weeks-long pilot strike in Oct., 1947, should be underwritten by the Government. The Board estimated that American Overseas had lost $840,000 because of the walkout.

CAB conceded that trans-Atlantic roundtrip excursion rates adopted by all carriers during the past winter resulted in a traffic gain for both AOA and PAA, but it indicated that the bulk of PAA's excursion business during the last quarter of 1948 was diverted from regular fare traffic.

The Board estimated Pan American actually lost a little revenue because of the excursion rates (roundtrip costing 133 percent of the regular one-way rate) and AOA gained some revenue because of the experiment. "In the light of the present cost picture," CAB declared, "it is unreasonable to assume that lower fares will result in an improved financial picture."

▶ **Fare Experimentation Necessary**—Some experimentation in off-season and directional fares is clearly appropriate to smoothing out the peaks and valleys in trans-Atlantic traffic, thereby utilizing facilities more efficiently, the Board continued. "However, the sharp off-season fare reductions embodied in the roundtrip excursion fare of 133 percent of the normal one-way rate do not appear to be a fruitful avenue of experimentation under present cost conditions.

"In our opinion, further experimentation along this line should employ more moderate reductions in off-season and off-direction fares, coupled with balancing increases in on-season and peak direction fares to the end that a leveling out in traffic is accompanied by an improvement in net passenger revenues."

NWA Stratocruisers

Northwest Airlines expects delivery on its first Boeing Stratocruiser early this month. After crew familiarization flights, craft is to go into service between the Twin Cities and Chicago on intermittent schedules about July 1.

During the summer and fall, the double-decked Boeings will be introduced on other NWA routes across the country. It is expected that they will be placed on the Orient run about Jan. 1, 1950.

C. R. Smith Tops Latest Pay Listing

Salaries of top executives in Pan American Airways, American Airlines and Eastern Air Lines showed little change last year from 1947 levels.

Highest payment in the latest group of 1948 salary reports went to C. R. Smith, formerly board chairman and now president of American. He received $60,000 last year, same as in 1947. Ralph S. Damon, now the $75,000-a-year president of TWA, received $40,000 as president of American in both years.

▶ **Trippe's Salary Unchanged**—Juan Trippe, Pan American Airways president, earned $20,000 plus $2650 in director's fees in 1948, compared to $20,000 plus $3050 as director in 1947. Samuel F. Pryor, PAA vice president and assistant to Trippe, was paid $26,000 in salary plus $10,000 as indirect compensation and $2450 as director last year, for a total of $38,450. In 1947, Pryor received $26,000 in salary, $14,000 in indirect compensation and $2250 in director's fees, for a total of $42,250.

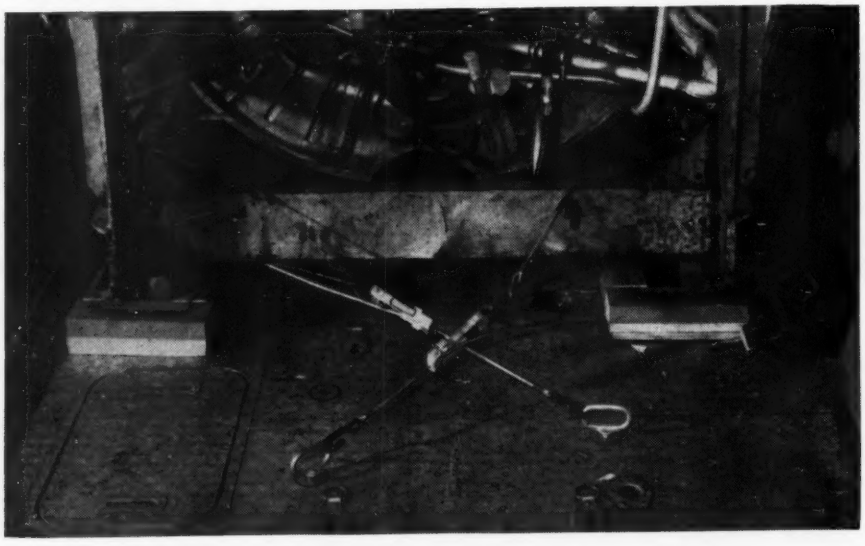
Eastern Air Lines President E. V. Rickenbacker was paid a $35,000 salary plus $5361 in director's fees and retirement plan contributions last year against $35,000 plus $2028 in indirect compensation in 1947. J. H. Carmichael, Capital Airlines president, received $27,500 in 1948 compared to $24,500 in 1947.

Other airline officials' 1948 compensation, with 1947 figures, where available, in parentheses:

▶ **Pan American**—H. M. Bixby, vice president, $13,000 plus $5000 indirect compensation, plus $2250 as director ($13,542 plus $6000 plus $1950); H. B. Dean, vice president, $25,000 plus $12,000 indirect plus $500 as director ($25,000 plus $12,500 plus $650); Franklin Gledhill, vice president, $24,000 plus $10,000 indirect plus $550 as director ($24,000 plus $10,500 plus $700); D. S. Ingalls, vice president, $23,014 plus $7000 indirect ($22,992 plus $7000); Erwin Balluder, vice president, $20,166 plus $7000 indirect ($19,000 plus $7,000); H. J. Friendly, vice president and general counsel, $25,000 plus $11,000 indirect plus $500 as director ($25,000 plus $12,500 plus $550); J. C. Leslie, vice president, $22,500 plus $7000 indirect ($22,500 plus $7000); J. C. Roop, vice president and treasurer, $18,000 plus $3000 indirect ($18,000 plus $7000); A. A. Priester, vice president and chief engineer, $20,000 plus $5000 indirect ($20,000 plus $4000); W. G. Lipscomb, vice president-traffic and sales, $20,000 plus $7000 indirect ($9667 plus $4000); W. L. Morrison, vice president-Latin American div., $22,000 plus $10,000 indirect ($22,000 plus $9000); J. H. Smith, Jr., vice president-Atlantic div., $18,333 plus $8000 indirect ($16,000 plus $7000); W. L. Bond, vice president-Orient, $22,041 plus $2500 indirect ($10,000 plus $2500); H. P. Morris, secretary and general attorney, $13,000 plus $2500 indirect ($13,000 plus $3500); J. S. Woodbridge, comptroller, $18,000 plus $6000 indirect ($18,000 plus $8000); A. M. Archibald, assistant vice president, $11,191 plus $3500 indirect ($10,000 plus $2500); J. C. Cone, assistant vice president, $15,000 plus $3500 indirect ($15,000 plus $3000); W. J. McEvoy, assistant vice president, $12,000 plus $2500 indirect ($12,000 plus $2500); H. H. Berke, assistant vice president, $14,333 plus $3500 indirect ($14,000 plus $2500); Amos Hiatt, assistant comptroller, $11,000 plus $4000 indirect ($11,000 plus $3500); R. G. Ferguson, assistant treasurer, $13,999 plus $4500 indirect ($14,000 plus $4000); E. G. Rothrock, assistant secretary, $6853 plus $500 indirect ($6000 plus $250); J. J. Brucia, assistant secretary, $4300 ($3573); J. H. Towers, assistant vice president, $11,367 plus $1000 indirect.

▶ **American**—O. M. Mosier, vice president, $25,000 ($25,000); William Littlewood, vice president, $25,000 ($25,000); Amos Culbert, vice president, $20,000 ($20,000); L. G. Fritz, vice president, $24,166 ($22,500); Rex Smith, Jr., vice president, $19,166 ($17,500); R. E. S. Deichler, vice president, $23,333 ($20,000); William Hogan, vice president and treasurer, $23,333 ($12,277); C. W. Jacob, vice president and secretary, $19,333 ($16,500); W. H. Miller, assistant vice president, $17,666 ($16,227); Carlene Roberts, assistant vice president $12,000 ($10,000); George Van Nostrand, assistant vice president, $12,000 ($9300); J. G. Zevely, assistant vice president, $11,988; Water Sternberg, assistant vice president, $13,176; C. R. Speers, assistant vice president, $12,838 ($10,000); M. D. Miller, regional vice president, $11,499 ($10,000); W. N. Bump, regional vice president, $10,749 ($10,000); A. R. Bone, regional vice president, $10,499 ($10,000); W. H. Johnson, regional vice president, $7693; Stanley G. King, regional vice president, $2177; P. G. Larie, comptroller and assistant treasurer, $15,466 ($13,600); V. J. Long, assistant treasurer and assistant secretary, $13,500 ($12,500); C. H. Kibbee, assistant treasurer, $13,200 ($13,200); T. O. English, assistant treasurer, $6750 ($3850); W. L. McMillen, assistant treasurer and assistant secretary, $11,333 ($10,000); A. A. Paradis, assistant secretary, $6666 ($5550).

▶ **Eastern**—P. H. Brattain, first vice president, $26,250 plus $3640 in director's fees



Device Aids in Cargo Tiedown

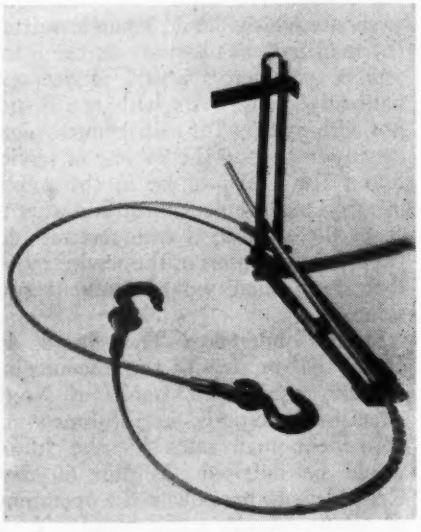
A new-type adjustable cable assembly for speedier cargo loading and tiedown has been adopted by several major domestic and international airlines.

Invented by Commander Kenneth L. Peck during the latter part of the war for quick-lashing of aircraft to carrier decks, the device now is manufactured by Peck's firm, Peck & Hale, MacArthur Airport, Sayville, N. Y.

It consists of two sections of wire rope, one beaded like a necklace, and a toggle lock. It instantly joins, adjusts, and locks positively, tensioning at the same time. Standard hooks or specially designed end fittings make it simple to attach to cargo tiedown rings, etc.

It operates much like a beaded key chain, except that the beads are movable along the wire rope core. The beaded end is joined to the toggle with the handle open. As toggle closes it exerts enough pressure to tension the system.

Any desired length can be obtained by adding short extensions which can be combined to hold any kind of heavy, boxed cargo. Light packages are lashed under cable nets, which in turn are secured by the adjustable tiedown units.



Airlines using this equipment are American, Eastern, KLM, Pan American, and United. According to American Airlines, the adjustable cable is "the most notable advance for air-freight security now available."

and retirement plan contributions ($22,500 plus $1528); S. L. Shannon, second vice president, $23,750 plus $2791 in director's fees and retirement contributions $20,000 plus $1313); T. F. Armstrong, secretary-treasurer, $16,875 plus $2191 as director and retirement contributions ($15,000 plus $1193); J. W. Moore, assistant secretary and assistant treasurer, $11,400 plus $1530 as director and retirement contributions ($9600 plus $1036); L. P. Arnold, vice-president, $16,875 plus $1796 retirement ($15,000 plus $407); M. M. Frost, vice president, $21,875 plus $999 retirement ($20,000); S. de J. Osborne, vice president, $21,875 plus $1606 retirement ($20,000 plus $373).

▶ **Capital**—R. G. Lochiel, vice president and treasurer, $20,365 ($20,160); R. J. Wilson, vice president, $16,560 ($17,280); J. W. Austin, Jr., vice president, $16,875; J. B. Franklin, vice president, $15,750; R. P. Wright, assistant treasurer, $9700 ($8500); Hayes Dever, secretary, $12,874 ($12,187).

▶ **All American**—Robert M. Love, president, $15,000 ($15,000); Charles W. Wendt, vice president and treasurer, $10,000 ($10,000); Halsey R. Bazley, vice president-operations, $10,000 ($10,000); David L. Miller, secretary, $6375 ($5250); Harry S. Fries, assistant treasurer and assistant secretary, $6300 ($6225); Walter C. Gebelein, comptroller, $6600 ($6450). Love held 88,845 shares, or 17.3 percent, of AAA's common stock at the end of last year.

▶ **Los Angeles Airways**—C. M. Belinn, president, $12,737; E. E. Jochim, assistant secretary and assistant treasurer, $800. Belinn held 7350 shares, or 25 percent, of LAA's common stock at the end of last year.

TTA Asks Board To Rescind Action

Trans-Texas Airways has struck back at a Civil Aeronautics Board move to put the feederline out of business when its present certificate expires in May, 1950 (AVIATION WEEK, Apr. 11).

James V. Allred, TTA general counsel and former governor of Texas, has petitioned the Board to rescind its action immediately. He said the dangling death sentence has hurt the feeder's operations materially and asserted that CAB's tentative opinion and show cause order says, in effect: "We will hear you and then hang you."

▶ **Extension Requested** – Trans-Texas contends that its certificate should be extended for a year beyond May 13, 1950, to allow a full three-year test period for its operations. Such extensions have previously been given to three feeders and are proposed for another.

Instead of deactivating its 2028 route miles, TTA wants CAB to enlarge its system. The carrier has requested immediate action on a bid for a new link from the upper Rio Grande Valley to Houston and San Antonio. It also has applied to take over short-haul routes in Oklahoma, Kansas and Texas which were certificated to Central Airlines, Oklahoma City. These links have never been activated.

CAB's show cause order has proved highly-injurious to TTA's financing, personnel and traffic problems, the company declared. It said the order was based in part on erroneous figures covering only the first 11 months of Trans-Texas' operations and on services over only a portion of the system.

▶ **Business Hurt**–Passengers at a number of points canceled their reservations following the Board order, apparently believing that TTA had been told to quit immediately. Applicants for jobs withdrew their requests.

Trans-Texas said that on the basis of total mail pay required per mile flown in revenue service its cost is substantially less than that of Southwest Airways and Pioneer Air Lines–two feeders whose certificates CAB plans to extend for five years. On the basis of total costs, from the beginning of operations to date, TTA asserts it is the most economical of all feeders.

▶ **Traffic Increases**–CAB's tentative findings were based on the average month's results for the period ending September, 1948, the petition declared. TTA said that by March, 1949, it had increased its traffic 134 percent and stood fourth among the 12 feeders in passengers carried and in passenger revenues during the month.

Trans-Texas described as "unthinkable CAB's tentative decision to turn over TTA's most productive routes to Pioneer Air Lines. TTA said Pioneer had not applied for the routes and, therefore, CAB has no authority to transfer them.

Put It This Way:

Colonial Airlines, which recently began its 20th year of scheduled operation without a fatality or serious injury to passenger or crew member, illustrates the magnitude of its achievement in this way:

An automobile with four passengers averaging 50 mph. would have to be driven for 1,252,728 hr. (or 429 years at 8 hr. per day) to equal the 250,545,622 passenger miles that Colonial accumulated without a fatal accident from Apr., 1930, to Apr., 1949. Safety record is also equivalent to taking one person around the world 10,000 times.

377s to London

Pan American plans to inaugurate first regular trans-Atlantic Stratocruiser service June 2.

The double-decked Boeings will make three regular-fare roundtrips weekly between New York International Airport (Idlewild) and London Airport via Gander, Newfoundland. Elapsed time eastbound will be 13 hr.–50 minutes faster than any previous schedule, according to PAA.

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FOR EXTRA HEAT PROTECTION

PLUS extra toughness

Whenever electrical jobs call for aircraft wires that can take abuse, get the extra heat protection, the extra toughness of Deltabeston aircraft wire. Three types meet all your needs for heat resistance in power and lighting circuits: synthetic resin with cotton braid—synthetic resin—asbestos with cotton or rayon braid. Built to take rough handling—they're all extra workable, because they're TOUGH, COMPACT, FLEXIBLE.

TOUGH—Special resin, felted asbestos, and tough braid make Deltabeston aircraft wires unusually resistant to abrasion and other abusive conditions.

COMPACT — Because the insulation packs plenty of heat resistance into small space, Deltabeston wires fit easily in cramped quarters.

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From two
to
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Sturdy, Dust-Tight
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Positive Detent.

Our switches have been used for years in test work as well as in permanent installations.

Write for catalog today.

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SHORTLINES

► **Braniff**—Reduced total time of flight delays 40 percent in 1948 compared with 1947.

► **British West Indian Airways**—Has asked CAB for a foreign air carrier permit to operate from Trinidad, B. W. I. (its base), to Miami via San Juan, P. R.; Kingston, Jamaica, and other points.

► **Continental**—Has asked CAB permission to reduce its Kansas City-Denver DC-3 skycoach fare from $22.10 (4 cents a mile) to $18.45 (3.3 cents a mile) to be more competitive with rail coach rates. CAB has not yet approved a certificated airline coach tariff below 4 cents a mile. Continental has been operating the low-fare service since February . . . President Robert Six has repeated his offer to buy Pioneer Air Lines, but PAL President Robert J. Smith says the feeder is not for sale, particularly in view of CAB's proposed five-year extension of Pioneer's certificate.

► **Eastern**—CAB has denied carrier's request for immediate exemption to operate from the south and southeast to San Francisco and Los Angeles. EAL has pending a certificate application for the route. CAB also denied Eastern's request for exemption to operate a daily nonstop New York-San Juan, P. R., flight (omitting Miami). EAL also has a certificate application pending for this service.

► **Los Angeles Airways**—Flew 371,570 lb. of mail on its helicopter routes in March, thereby maintaining the high volume reached last December.

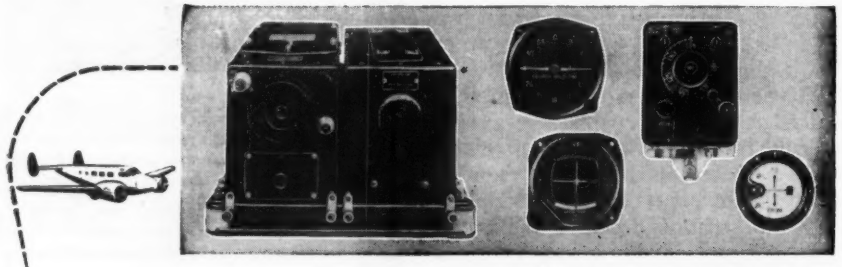
► **Mid-Continental**—Has been authorized to suspend service at Huron, S. D., pending airport improvements.

► **Northwest**—Recent Mediation Board award gives stewardesses and pursers about 5 percent more pay. New stewardess wages start at $180 monthly, going up to $225 monthly after seven years on domestic runs, and range from $200 to $275 (after seven years) on international flights. Pursers start at $260, going to $350 after four years.

► **Pioneer**—Carried 20,110 passengers in first quarter 1949 against 14,493 in the same period last year. Mail volume was up 100 percent, express 74 percent and freight 314 percent.

► **Post Office**—Has placed in effect special air mail rates for dispatch of commercial papers, printed matter and merchandise samples to 36 trans-Atlantic countries.

► **Trans-Canada**—Is moving its headquarters from Winnipeg to Montreal.



The Magic of VHF

Airborne Equipment for:
OMNI-DIRECTIONAL RANGES
RUNWAY LOCALIZERS
VISUAL-AURAL RANGES
SIMULTANEOUS VOICE
GCA VOICE RECEPTION

The Type 15A VHF Navigational Receiving Equipment (illustrated) provides for reception on the new Omni-Directional Ranges as well as operation on both types of VHF Runway Localizers, and the VHF Visual-Aural Airways Ranges. Simultaneous voice feature is included on these ranges. The *tunable* A.R.C. Receiver permits selection of any VHF aircraft frequency.

The A.R.C. Type 17 or A.R.C. Type 18 is the companion communication equipment normally associated with the Type 15A. The Type 17 VHF Communication Equipment adds independent two-way VHF communication facilities. The Type 18 adds VHF Transmitting Equipment only. All Type 17 and 18 units are type-certificated by the CAA.

The dependability and performance of these VHF Communication and Navigation Systems spells increased safety in flight. Specify A.R.C. for your next installation.

ARC Aircraft Radio Corporation
BOONTON, NEW JERSEY
DEPENDABLE ELECTRONIC EQUIPMENT SINCE 1928

CAB SCHEDULE

May 2—Hearing on Los Angeles-Honolulu service in reopened Hawaiian case. (Docket 851 et al)

May 2—Hearing on additional southern transcontinental service. (Docket 1102 et al)

May 9—Hearing in Empire Air Lines' certificate extension case. (Docket 3649)

May 9 or 16—Hearing in North Atlantic route transfer case. (Docket 3589 et al)

May 17—Hearing on seasonal service to Lake Tahoe. Postponed from Apr. 25. (Docket 3623)

July 18—Hearing on Hughes Tool Co. control of TWA. Postponed from May 16. (Docket 2796)

Flight Plan Changed

Elal Israel Aviation's DC-4, originally scheduled to carry Israeli President Dr. Chaim Weizmann from his country to the U.S. for a dinner in his honor, encountered mechanical difficulties enroute. Dr. Weizmann completed his trip to this country by Air France. On the basis of information available at press time, AVIATION WEEK had reported that Elal carried Dr. Weizmann the entire trip.

LETTERS

Insurance Facts

Mr. Larry Armor in his letter printed Apr. 4 has not only failed to outline the problem in exact terms but contradicts himself by saying first, that "the company thinks it could become liable for damages amounting to seven figures," and then, that "insurance is an obstacle."

Does he mean that insurance is not available on the Cessna he mentions? If it is not, then the fault no doubt lies with either the pilot who flies it, a past history of losses, or some comparable factor.

If he is bemoaning the large amount for which a company might become liable, the answer is simple. Aviation liability limits are often high enough to shock the average automobile underwriter, but they are available. Mr. Armor can blame only his fellow men who make up the juries in this country for the ridiculously high judgments being rendered these days. This is an era when the great American public believes in "soak the rich" (insurance companies) and "get something for nothing."

The solution to all of this is possible of attainment if Mr. Armor is talking about insurance costs. When most pilots become modest, claim figures will lower and so will insurance rates. We are all looking forward to that day.

As Edison said, "When all the facts are known, the answer becomes obvious." Let's get the facts straight.

J. Robert Chapman, Branch Manager,
Kansas City Office
Associated Aviation Underwriters
916 Walnut Street
Kansas City 6, Mo.

Takeoff Race

We noted with interest your article on the Navion-Bonanza takeoff contest. We, too, had a friendly contest with the Beech distributor whose operation is next door to our own. We, of course, are the Navion distributor. We had heard earlier of the success of the Navion in the Albuquerque contest and in a joking way reported it to our Beech distributor. He immediately challenged us and we arranged the takeoff contest on the Municipal Airport here.

Flags were placed along the runway and representatives of both airplanes witnessed the contest. In three separate takeoffs the Navion was able to defeat the Bonanza by approximately 50 ft. The best Navion takeoff was 210 ft. and the best Bonanza takeoff was 260 ft. The contestants used a standing start and the tower reported no wind during the time of the contest.

Although we were able to come out on top in this particular instance, we would

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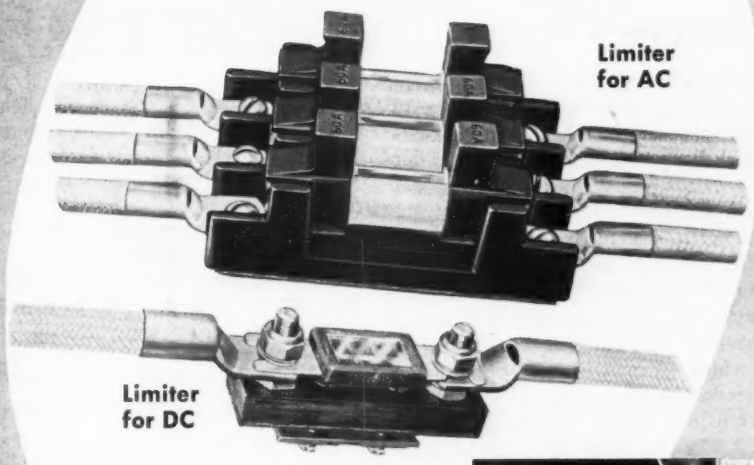

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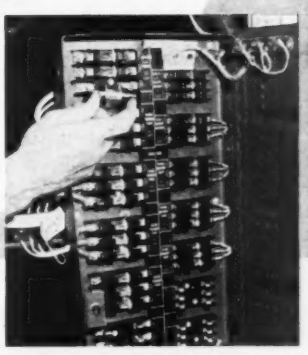

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like to state that, win or lose, contests of this nature motivated by good friendly competition represents the type of competitive spirit which will produce better results in future aircraft sales.

JAMES P. HOBSTETTER, President
Southern Ohio Aviation Co.
Dayton Municipal Airport
Dayton, Ohio

Insurance

Referring to Apr. 4 AVIATION WEEK, letters page: Larry Armor brings up a problem that can easily be solved if he and other potential flyers were made aware of an airplane accident policy written by Associated Aviation Underwriters.

I am not an insurance salesman but do get in some 200 odd hours per year in our Navion. Being turned down by insurance companies for additional term insurance I bought Basic Aviation Accident Policy for $142 which covers any form of injury or death involving all commercial and private aircraft in the sum of $25,000 plus $1000 medical bills plus $50 weekly disability for 26 weeks. This sort of coverage, if known, is priced moderately enough that no one should use the insurance excuse for not flying.

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It Was Oakland

I have just noticed in your column in the Mar. 14 issue of AVIATION WEEK a reference to the transfer of Colonel Lester J. Maitland as director of Aeronautics from Wisconsin to Michigan.

You say that in 1927 Colonel Maitland and Albert F. Hegenberger were responsible for the Bird of Paradise flight "from San Francisco to Honolulu." As a matter of fact, the flight was from Oakland Municipal Airport, Oakland, Calif., to Wheeler Field.

To keep the record clear, all pioneer trans-Pacific flights were from Oakland Municipal Airport.

J. WALTER FRATES, Port Publicity Rep.
Port of Oakland, Board of Port Commissioners
Oakland 7, Calif.

Blames Plane Makers

After your editorial Mar. 14 on "Better Lightplane Merchandising," you might be interested in a dealer's point of view.

The editorial might better have been written on the subject of Better Lightplane Manufacturing rather than Merchandising. Your editorial asked, "What kind of a dealer is it who cannot average one plane a year?" I ask, how can any dealer sell an airplane today representing it as being new and modern when the lightplane manufacturers provide us with outmoded prewar aircraft?

Of course, the dealers bought hundreds of these ships for their own fixed base use. They had no alternative. The public at the end of the war was crying for the doors of the air age to open and admit them. Today, the public is just crying. Of course, they are not flying since the promised postwar airplane "that grandma could fly" never materialized. The manufacturers jumped in with both feet to get postwar gravy for their prewar planes.

These remarks apply to all lightplane manufacturers of the writer's knowledge and not to Mr. Lawler's Aeronca Aircraft Corp. alone. Since you wrote of Aeronca in telling of Mr. Lawler, where is the Aeronca Chum which I believe was to have been one of their postwar models?

Give the dealer a plane the public wants and can use and you will have sales and salesmanship. The writer personally does not advise anyone to try "to raise the temperature of the typical aircraft dealer." Some of us and the public too are pretty hot already.

J. S. SHOWALTER
The Showalter Corp.
Winter Park, Fla.

Landing Speeds

In the data on U. S. Transport Aircraft, page 85, AVIATION WEEK, Feb. 28, 1949 (Yearbook), we notice that the landing speed information given regarding the Douglas DC-4, DC-6 and DC-6A is not consistent with that given for other airplanes listed.

On checking, we find that the landing speeds given you by us and listed by you for the DC-4, DC-6 and DC-6A are actually speeds at 20 percent above the stalling speed (in accordance with the definition commonly used for operational landing speed,) whereas all other landing speeds given are actual stalling speeds. Accordingly, it will be appreciated if these listed landing speeds are changed as follows:

Douglas DC-4: Change 100 mph. to 83 mph.

Douglas DC-6: Change 107 mph. to 89 mph.

Douglas DC-6A: Change 112 mph. to 93 mph.

A. E. RAYMOND, Vice President Engineering
Douglas Aircraft Company, Inc.
Santa Monica, Calif.

Stunts

Your editorial, Mar. 28, "Stunt or Achievement?"—was a master's use of very few words.

It could well be the outline for a volume.

CYRIL C. THOMPSON, Executive Secretary
Airport Operators Council
Washington 6, D. C.

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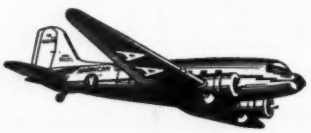

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Yet while we are offered every inducement to keep costs at a minimum we are presented with an equally balanced incentive to send out only the finest possible product. For if we were to ship an inferior engine we would risk a potential failure for which we would be bound to recompense our customer through the Steward-Davis 600-Hour Warranty. And if we did not act in good faith within the terms of this warranty we could expect to lose that customer's good will, and perhaps all his future business in the years to come.

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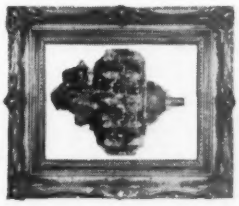

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THE DISAPPEARING CARRIER—Today, so soon after Defense Secretary Johnson's decision to cancel construction of the giant aircraft carrier United States, we present **Dave Olds'** censored version of his song about the disappearing carrier. It should be sung to "Strip Polka." We crib this version from the privately printed book of war ditties prepared by Fairchild's Vice President **Dick Boutelle** and Fairchild PIO **Warren Smith.** In fairness to the Navy, we pledge future space for proper ribbing of the Air Force.

THE 80,000 TONS THAT DISAPPEARED

Three years it took to build her, three long years to make her float,
But when she put out to sea she was one hell of a big boat.
Oh, the Navy they did love her, but a sub her finish wrote,
She's the 80,000 tons that disappeared.

On the day that she was launched, the bands and brass they all were there,
For here was a floating runway that the Air Force couldn't bear.
But she tangled with some Yaks, and suddenly she wasn't there,
She's the 80,000 tons that disappeared.

There were twelve or twenty Admirals, each with sitting room and bath,
There were ninety short range bombers to subdue the Commy's wrath,
But a thousand miles from launching range she crossed a big bomb's path,
She's the 80,000 tons that disappeared.

She's got radar, she's got fighters, she's got flak beyond compare,
But her tiny little bombers wouldn't muss a Cossack's hair.
Returning from a mission, please imagine their despair,
She's the 80,000 tons that wasn't there.

She's got armor plate and speed, and range and ice cream sodas too,
And her pilots live in splendor, but her days are all too few.
Three years it took to build her, and three minutes to snafu,
She's the 80,000 tons that disappeared.

* * *

RUSSIANS TAKE OFF, AND HOW—**Roy F. Eckert** of Millbrae, Calif., dispatches this description of a Russian IL-12 takeoff from Tokyo the other day:

"While our Clipper crew were awaiting a bus to the hotel in Tokyo on Dec. 29 we gawked at 40 odd "comrades" escorted by brawny American MP's as Joe's constituents boarded a twin-engine transport for some obscure destination in the motherland.

"Most of the passengers were civilians, evidently of the diplomatic corps, and also evidently VIP's, because of the assorted military brass with accordion type boots and ranging from one gold stripe on the shoulder boards to 3-star dinguses, and all riding in imitation Packards.

"The IL-12 had no markings except a prominent red star on the vertical stabilizer. We decided this hybrid craft was sired by a Convair-Liner and dammed by a C-46 as the Red pilots taxied it from the parking area to the loading ramp with frequent jabs at the brakes. The alternate ducking of nose and tail reminded us of the Gooney bird dances which we observe in Midway.

"Engine run-up and mag checks were accomplished within one minute from a cold start—evidently excellent copies of R-2600 Wrights—even better, we decided, since the Wrights on our NATS PBM's wouldn't take that sort of treatment.

"They even had fixed vanes behind the props for better cooling, also reminiscent of later PBM's which allegedly added about 150 hp per engine due to lower head temperatures.

"Just to make certain the comrades wouldn't decide to make detours or that some eager-beaver Mustang pilot wouldn't create an incident on the basis of 'negative IFF', a Fortress and three Black Widows accompanied the IL job."

* * *

SHORT CIRCUITS—They're telling this true story on **Evan Schuette** of Dow Chemical Co.'s technical dept. in the magnesium division: He left Midland, Mich., for the ANC-5 panel meeting at Wright Field and got all the way to Ft. Wayne before he discovered he was exactly a month ahead of time. He spent the next day back at the office ad libbing clever replies to embarrassing questions. . . . Remember the funny account we reprinted in this column about **Henry McLemore's** trip on an Indian airline? The editors of Indian Skyways reproduced it and then said they didn't see a thing humorous about it. We are sorry if we offended the Indians; just an international difference in humor. R.H.W.

WHAT'S NEW

NACA at Work

What is success in a laboratory?

From work in the research centers of the National Advisory Committee for Aeronautics has come most of the developments that have spelled U. S. leadership in aviation.

What have those developments been . . . what effect have they had? The full record of NACA's work in the fiscal year just past, bulwarked by references to the practical applications of that work, appears exclusively in the next issue of AVIATION WEEK.

Revisions in ATA Yearbook

Because of an expedited publishing deadline, the Air Transport Assn. was unable to check final proofs of its manuscript for Air Transport Facts & Figures which appeared in AVIATION WEEK, Mar. 21. The following revisions should be made:

Page 2—First column, third paragraph should end after the word "reduced."

Page 4—Total passenger miles in graph at bottom of page should be 5,988,668,000.

Page 9—Table on "Comparative Transportation Safety Record," Domestic Scheduled Air Transport Planes for 1948 should read 83.

Page 10—Table on "Airline Stops" —Certification date should be January 31, 1949. Last line should read "Stops not in use (49 trunk; 192 feeder; 11 combination trunk and feeder) . . . . . 252)."

Page 10—Graph at bottom of page —"First Class Travel Market"—line to left of graph should read "Billions of Passenger Miles."

Page 11—Table on "Domestic Airline Percentage of First Class Travel Market," add three zeros in parentheses under first three headings, thus indicating that figures are in billions. Along with this, Pullman Passenger Miles for 1947 should be 13,000,000 (Est.).

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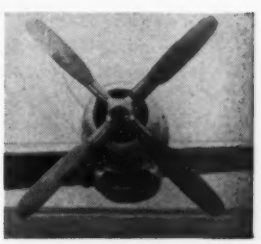

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EDITORIAL

Mr. Johnson's News Policy Bogs Down

(We asked Robert Hotz, AVIATION WEEK's News Editor in Washington, to send us a memo on Secretary Johnson's new "unified" public relations. This is his report.—RHW.)

Government agencies with organizational problems seem instinctively to turn to censorship as a panacea for their troubles. They apparently feel that if their dirty linen can be aired only in their own high-fenced backyard all will eventually be well.

This familiar Washington routine is now being repeated in the National Military Establishment where Defense Secretary Louis Johnson is trying to tie the loose ends of his sprawling agency into a semblance of unification.

One of the first noticeable effects of the new defense regime has been the familiar attempt to clamp down the lid of censorship on the pious pretext of military security. However, military security is apparently not the only issue involved.

Consolidation Directive No. 1 issued on Apr. 14 under the imprint of the Defense Secretary and signed by his public relations chief, William Frye, states that the official NME censors will screen all information emanating from the Pentagon not only for military security but for the added reasons of "policy and propriety."

This is the same type of censorship that the State Department tried to jam through as a Presidential Executive Order several years ago. It is the same type of censorship that slaps a "confidential" stamp on anything that might prove embarrassing to a government official or a government agency. It is the type of censorship that no reporters or publications worth their salt will swallow.

Loud shouts have recently been raised on Capitol Hill regarding alleged leaks of "military secrets." Detailed analysis of these charges indicates that the alleged "secret" that caused the most fuss involved primarily information obtainable from any Rand-McNally atlas.

Determination of legitimate military security is a difficult job even for experts. But unfortunately, most attempts to enforce military security are based on a rigid set of regulations that have little regard for reality and are administered by personnel with neither the technical background nor the military experience to qualify as experts.

Nor is there even uniformity between the three services on what consitutes military security. For example, the Air Force releases photos of a new airplane when it is hauled out of a factory onto an open airfield. The Navy says a new airplane is "classified" until it flies.

Consequently, the photo of the Convair P5Y flying boat published in AVIATION WEEK Apr. 25 is still "classified" by the Navy despite the fact that the plane is sitting in plain view of passengers at the San Diego commercial airline terminal and a newspaper photographer was able to photograph from the airline terminal the picture used in AVIATION WEEK.

In a similar vein, the Navy kept a security clamp on the North American XAJ-1 bomber for nearly a month after it had been making regular test flights from Los Angeles Municipal Airport before thousands of spectators and airline passengers.

To complicate the problem of military security still further, publicity on a new helicopter was recently delayed long after the machine had flown, and long after a similar type in competition for the same contract award had been released by the Navy. This delay was due to a particular admiral's pique at the helicopter firm involved.

Within the past year, details on three new Air Force planes were released simply because a four-star general wished to use the material in a public speech.

Clearly there is no rhyme nor reason to this type of security administration even if the regulations were originally sound. If there is such a thing as genuine military security, and we believe there is, it must be based on something sounder than an admiral's pique or a general's whim.

The manner in which Defense Secretary Johnson handled the announcement on cancellation of the Navy's super-carrier does little to inspire confidence in his new public information policy. After dodging press queries on the grounds that he would later make an adequate announcement on the super-carrier's fate, Johnson eventually issued a two-sentence decree that tells nothing of how or why the carrier was scrapped. The public, whose safety depends on the correctness of Mr. Johnson's decisions, certainly is entitled to more explanation than two sentences.

Counter-attacking this pronounced trend by the executive branch of the government to tell the people less and less about what the government is doing, and what is happening to their tax-collected dollars, are a few public spokesmen on Capitol Hill stoutly demanding more information on what the defense establishment is doing with the billions.

Among these is Rep. Carl A. Vinson (D., Ga.), chairman of the House Armed Services Committee, who is perhaps a better qualified expert on military security than some Pentagon bureaucrats. Vinson urged the House Appropriations Committee not to fall for the use of military security as a cloak to cover military budget manipulations. He called upon Congress to demand more information from the military.

We agree with Mr. Vinson that Congress and the people need to know more, not less, about what the government in general and the defense department in particular is doing with public money. It may be significant that the Air Force, which has done more than any other service to inform the public and Congress about what it is doing, has fared best in the annual appropriation battles on Capitol Hill and rates highest in public esteem. That is the ultimate test for any governmental policy.

All will agree that the National Military Establishment needs a radical overhaul of its public relations policy. However, the goal should be dissemination of more honest facts and not a censorship aimed at suppressing inter-service policy rows. These controversies may seem to violate the Pentagon propriety standards but actually they are the healthy competitive arguments essential to any type of progress.

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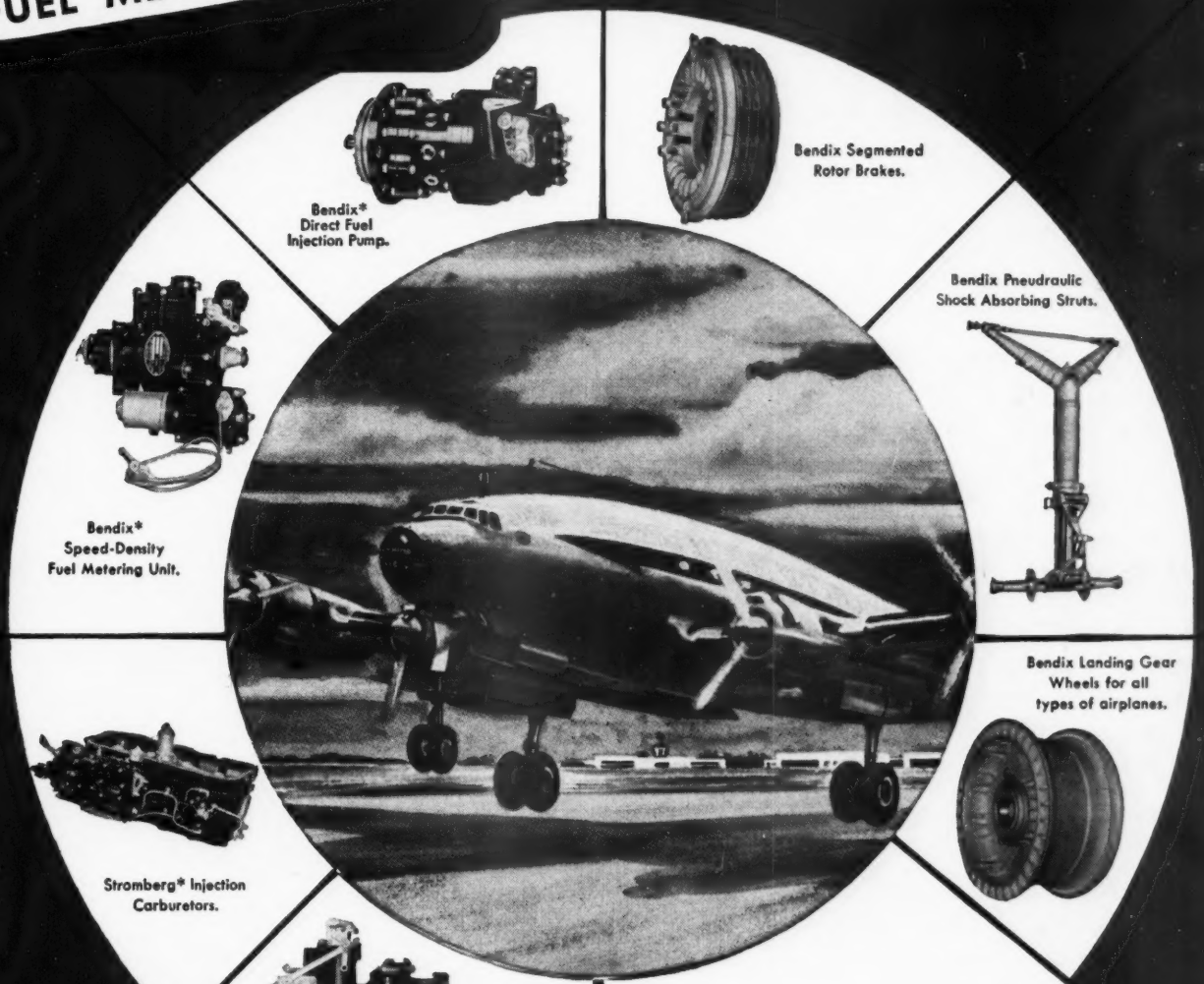

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